Water Conditions Summary

Operations Control, Engineering & Vegetation Management Department

Operations & Maintenance Resource Area

Governing Board Presentation

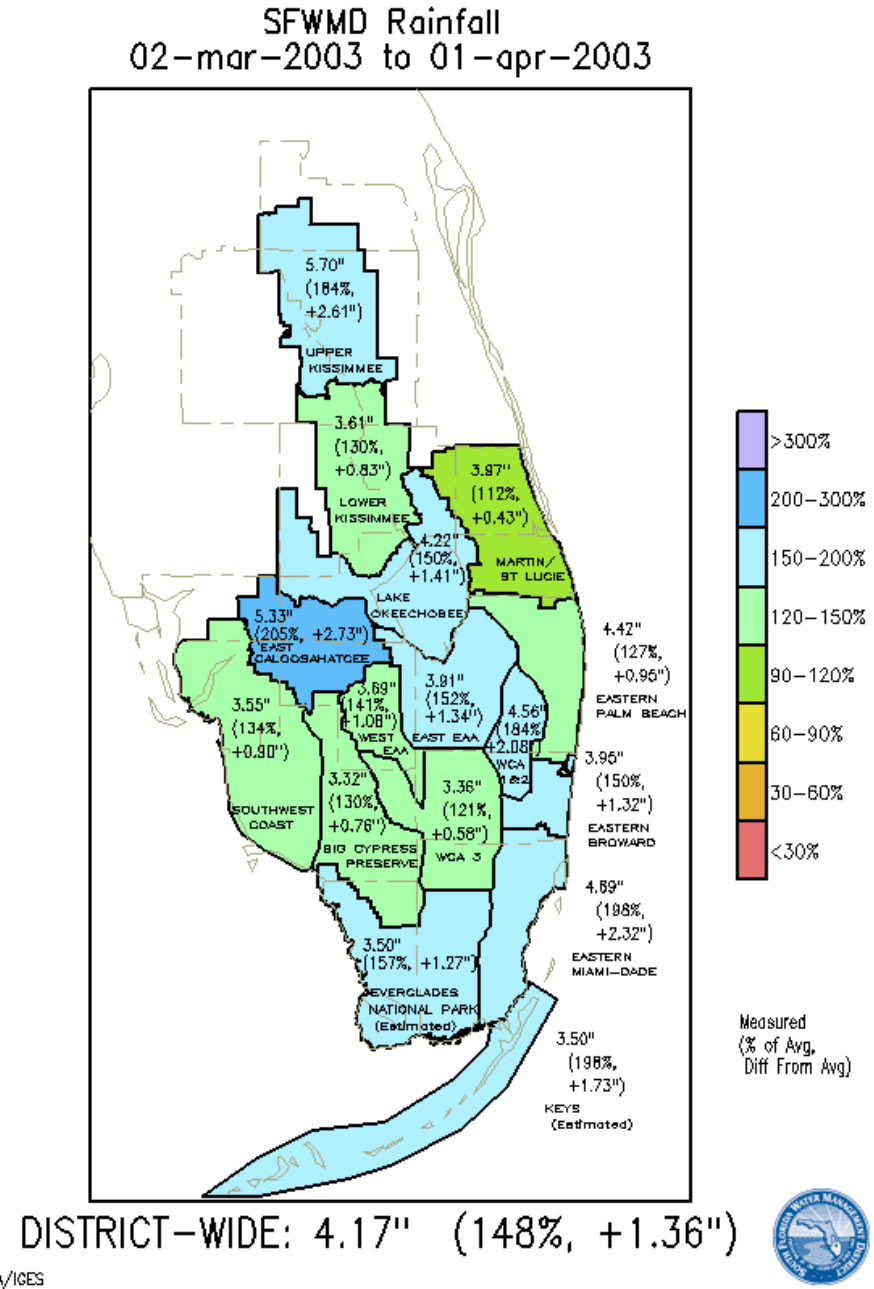
April 10, 2003

Meteorological Conditions

Meteorological Conditions

- After an extended dry period through January and Mid-February, District-wide rainfall in March was above average
- March Rainfall : District-wide rainfall was 148% of average
  - Normal Rainfall: 2.81 inches
  - Actual Rainfall: 4.15 inches
  - Est. Pan Evaporation: 5 inches
- April Rainfall : First significant rainfall of the month occurred yesterday (Wednesday)

- Most areas of the District received above average rainfall in March
- Heaviest rain focused in the eastern Caloosahatchee Basin



General Hydrologic Conditions

Governing Board Presentation - April 10, 2003

General Hydrologic Conditions

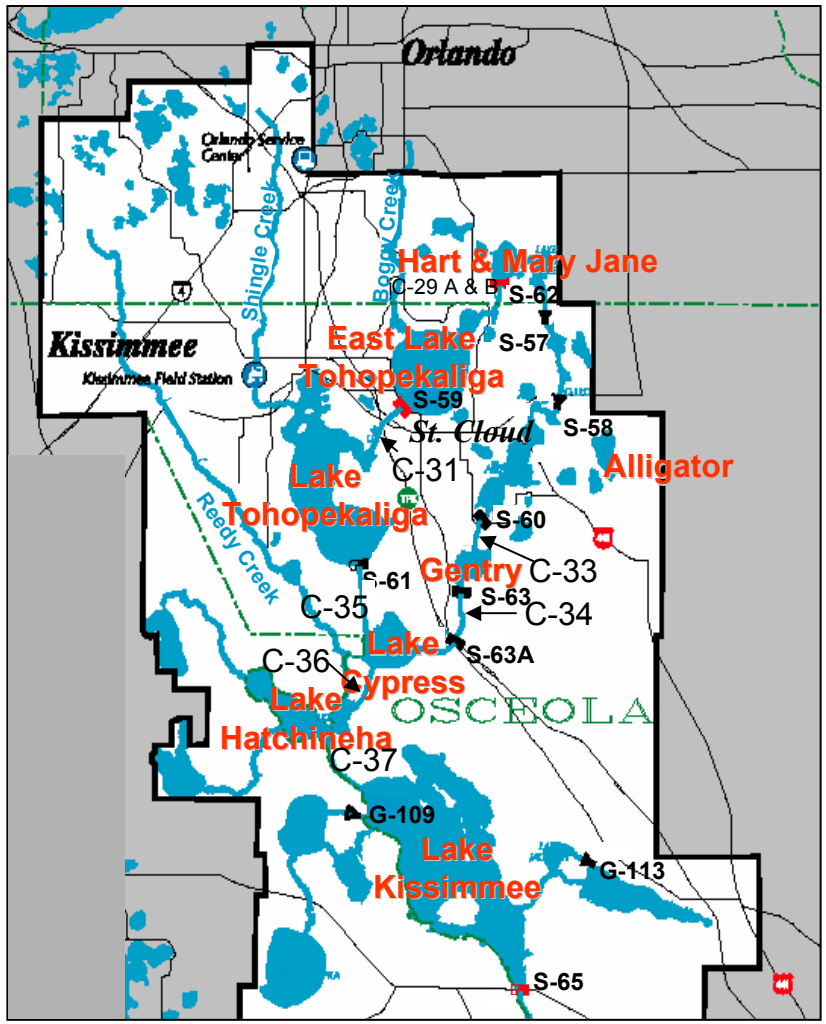
- G **Upper Chain** – Normal levels
- G **Kissimmee River** - Normal seasonal flows
- Y **Lake Okeechobee** - Above desirable stage
- G **Lake Okeechobee Agriculture**
- G **Estuaries** – Normal seasonal salinity

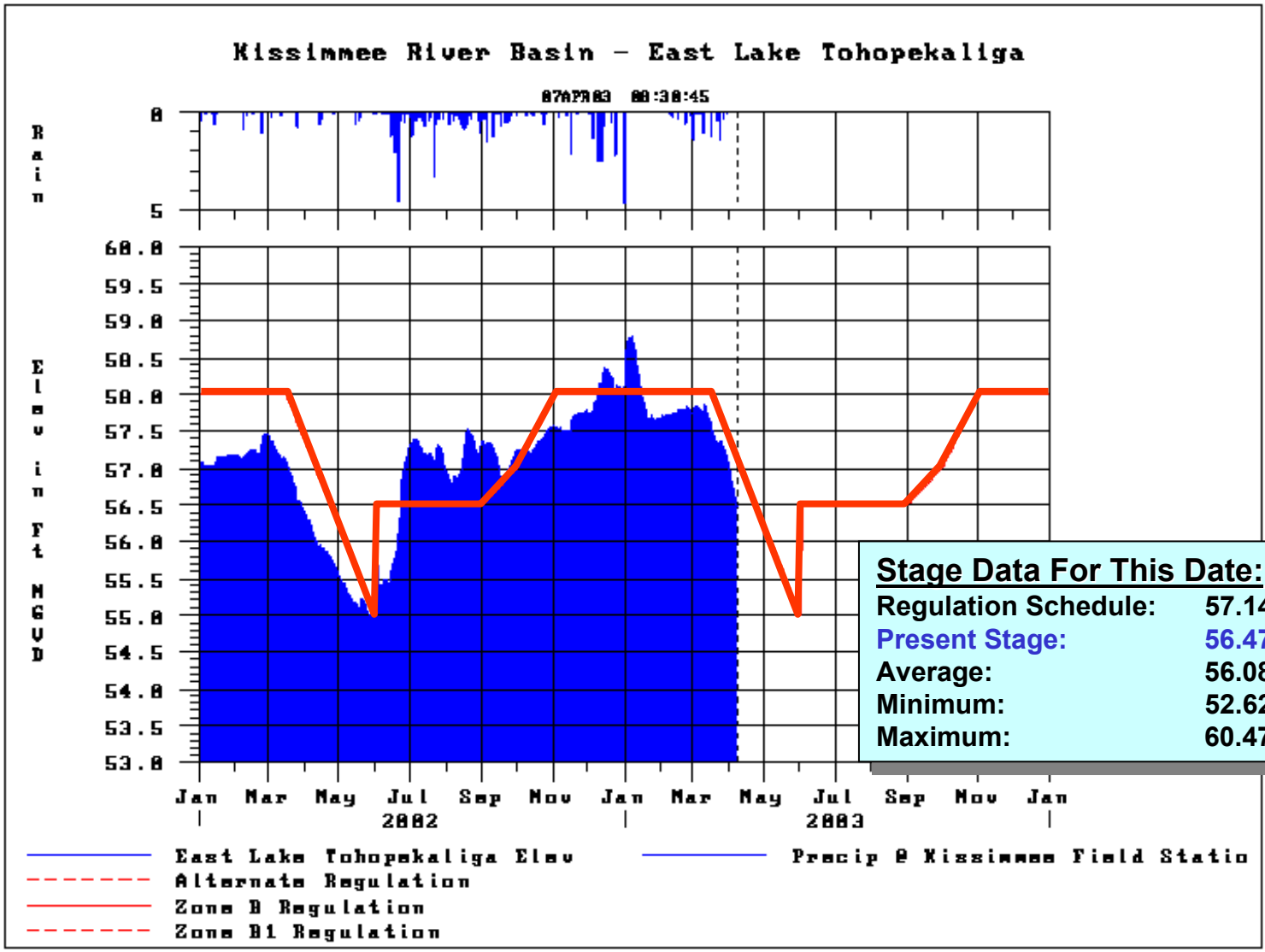
General Hydrologic Conditions

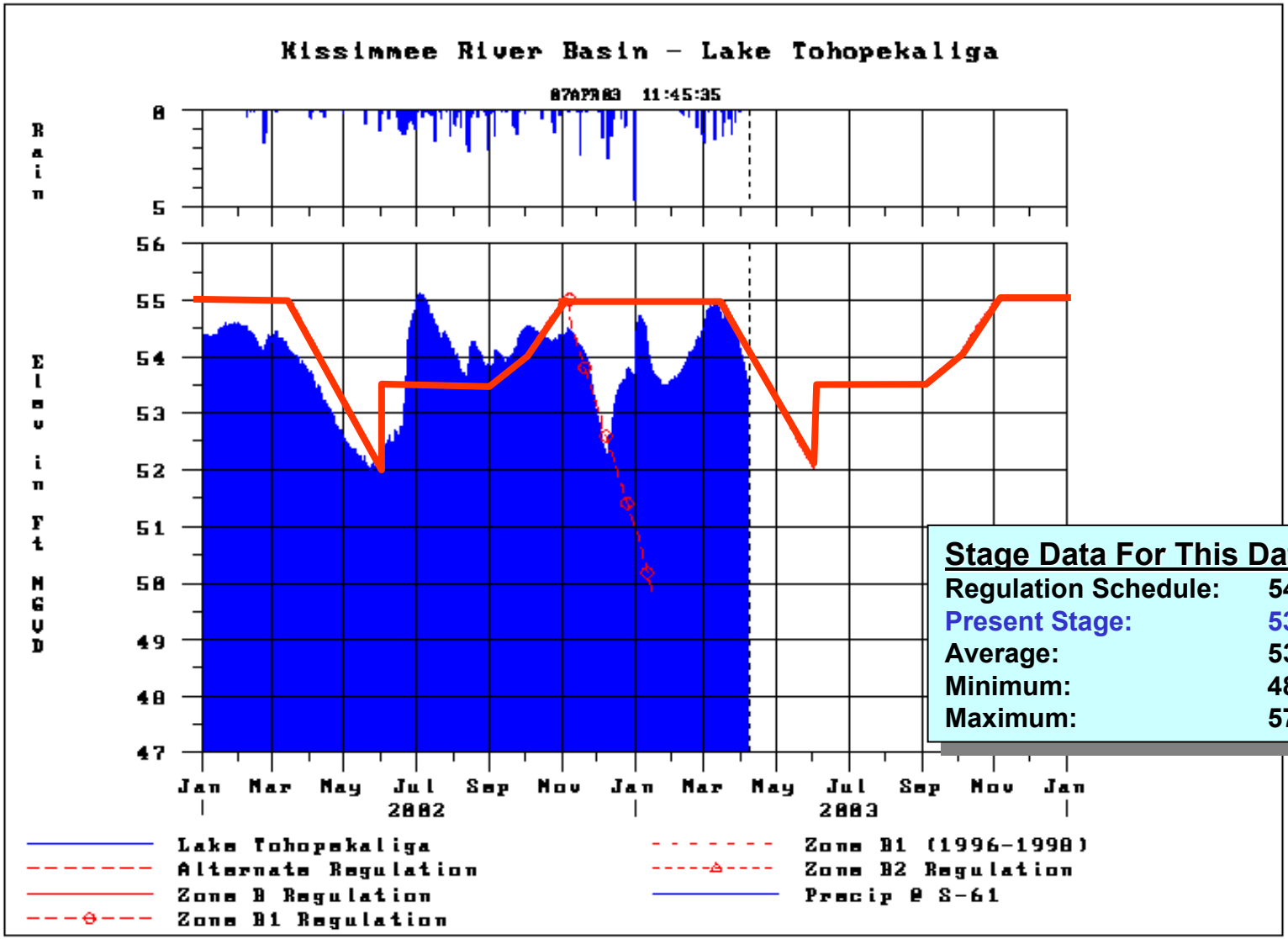
- **Water Conservation Area 1** - Near Sched.
- **Water Conservation Area 2** - Near Sched.
- **Water Conservation Area 3** - Near Sched.
- **ENP** - Normal seasonal conditions
- **Fl. Bay** - Normal seasonal conditions
- **Upper East Coast** - low canal levels
- **Lower East Coast** - Norm. seasonal grndwtr.
- **Lower West Coast** - Norm. seasonal grndwtr.

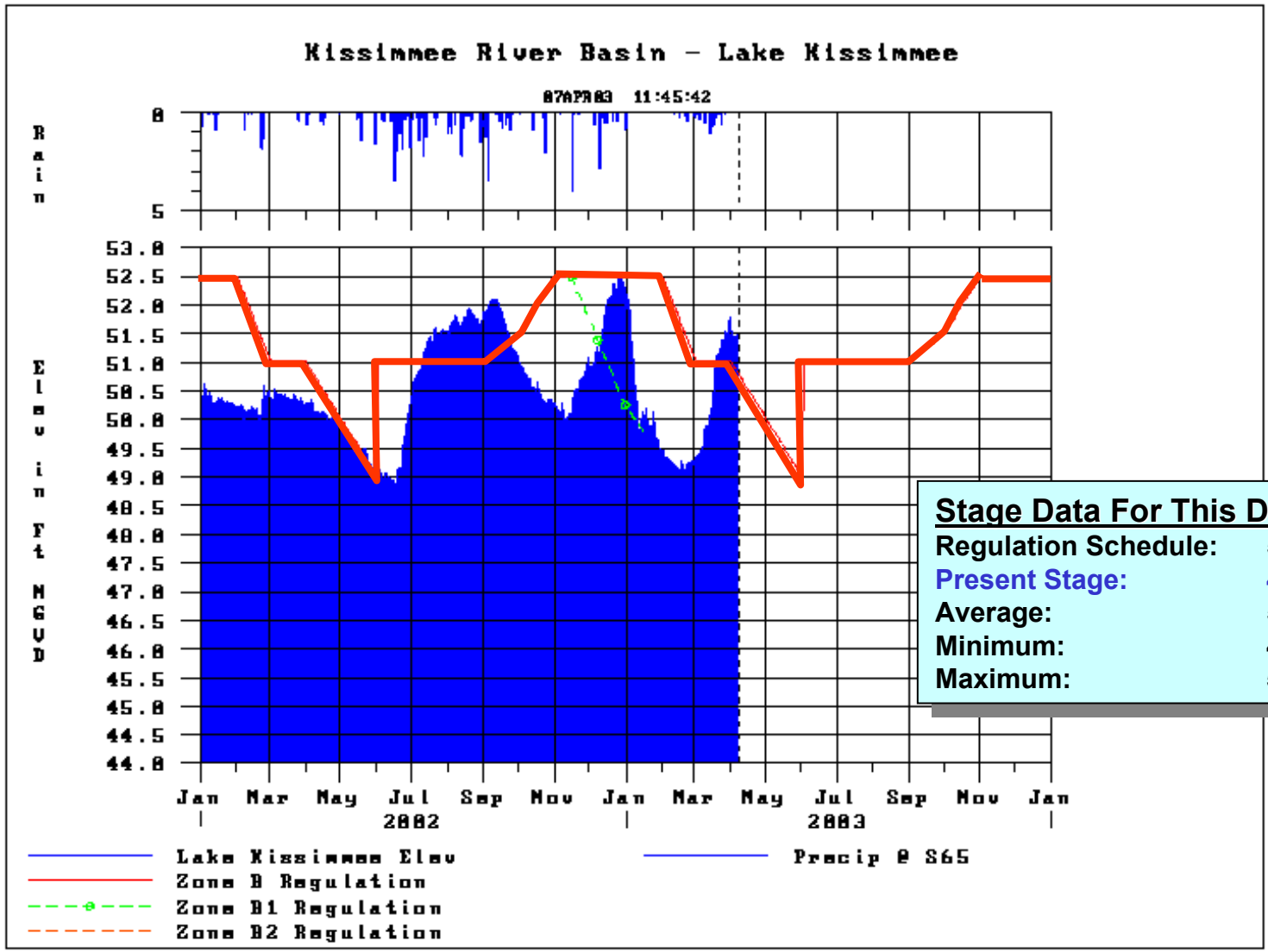
Hydrologic Conditions
Upper Kissimmee Basins

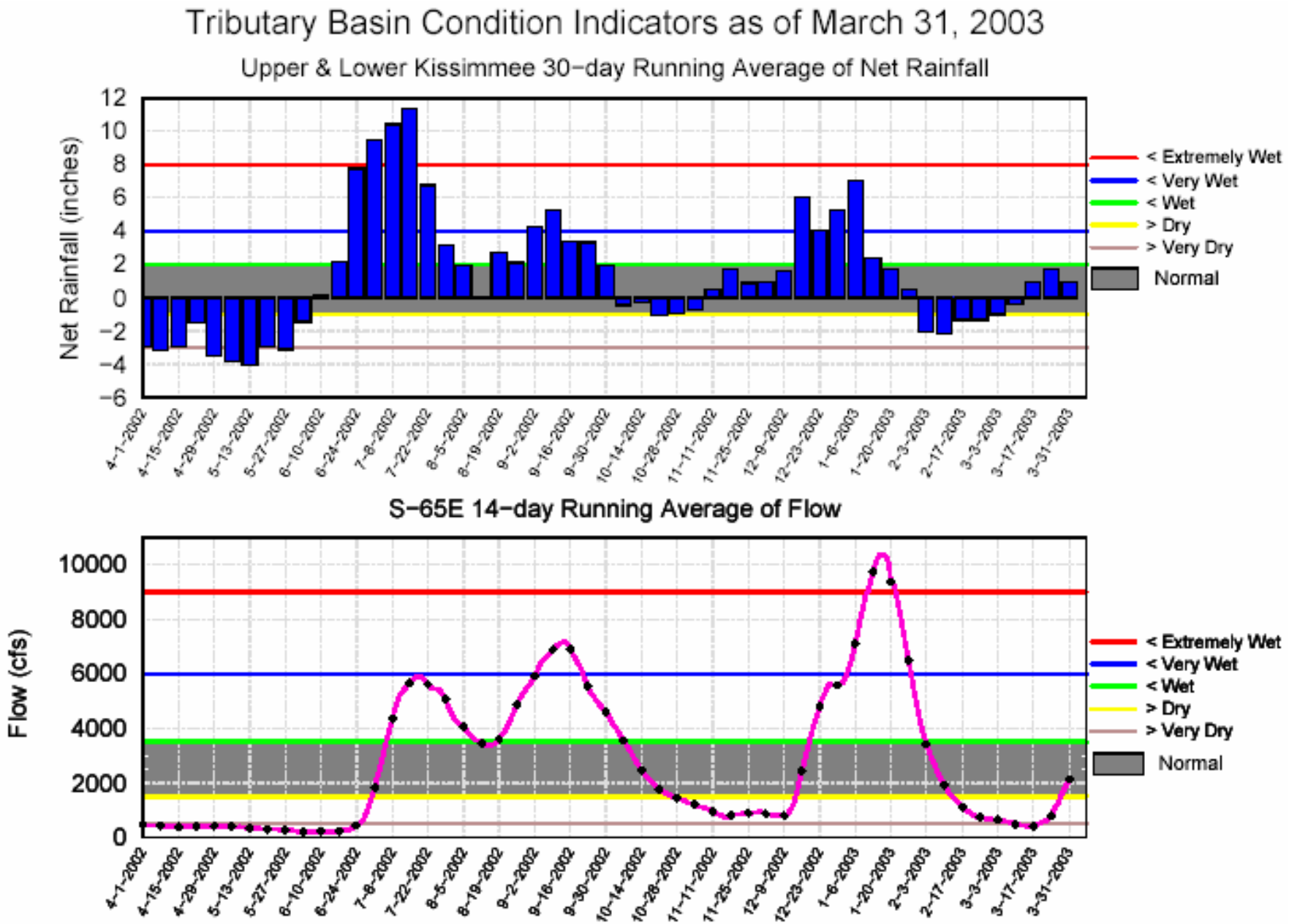
- Structures at most lakes have initiated regulatory releases to lower stages
  - This helps ensure that lakes will have adequate storage available to accept inflows at the start of the wet season in June
- Lake Toho Hydrilla Treatment
  - USACE, approved a temporary deviation to facilitate the project




Kissimmee River Basin - East Lake Tohopekaliga
07APR03 08:30:45
Rain
Elev in Ft MSVD
0
5
60.0
59.5
59.0
58.5
58.0
57.5
57.0
56.5
56.0
55.5
55.0
54.5
54.0
53.5
53.0
Jan Mar May Jul Sep Nov Jan Mar May Jul Sep Nov Jan
2002
2003
East Lake Tohopekaliga Elev
Precip @ Kissimmee Field Statio
Alternate Regulation
Zone B Regulation
Zone B1 Regulation
Stage Data For This Date:
Regulation Schedule: 57.14
Present Stage: 56.47
Average: 56.08
Minimum: 52.62 (1962)
Maximum: 60.47 (1960)

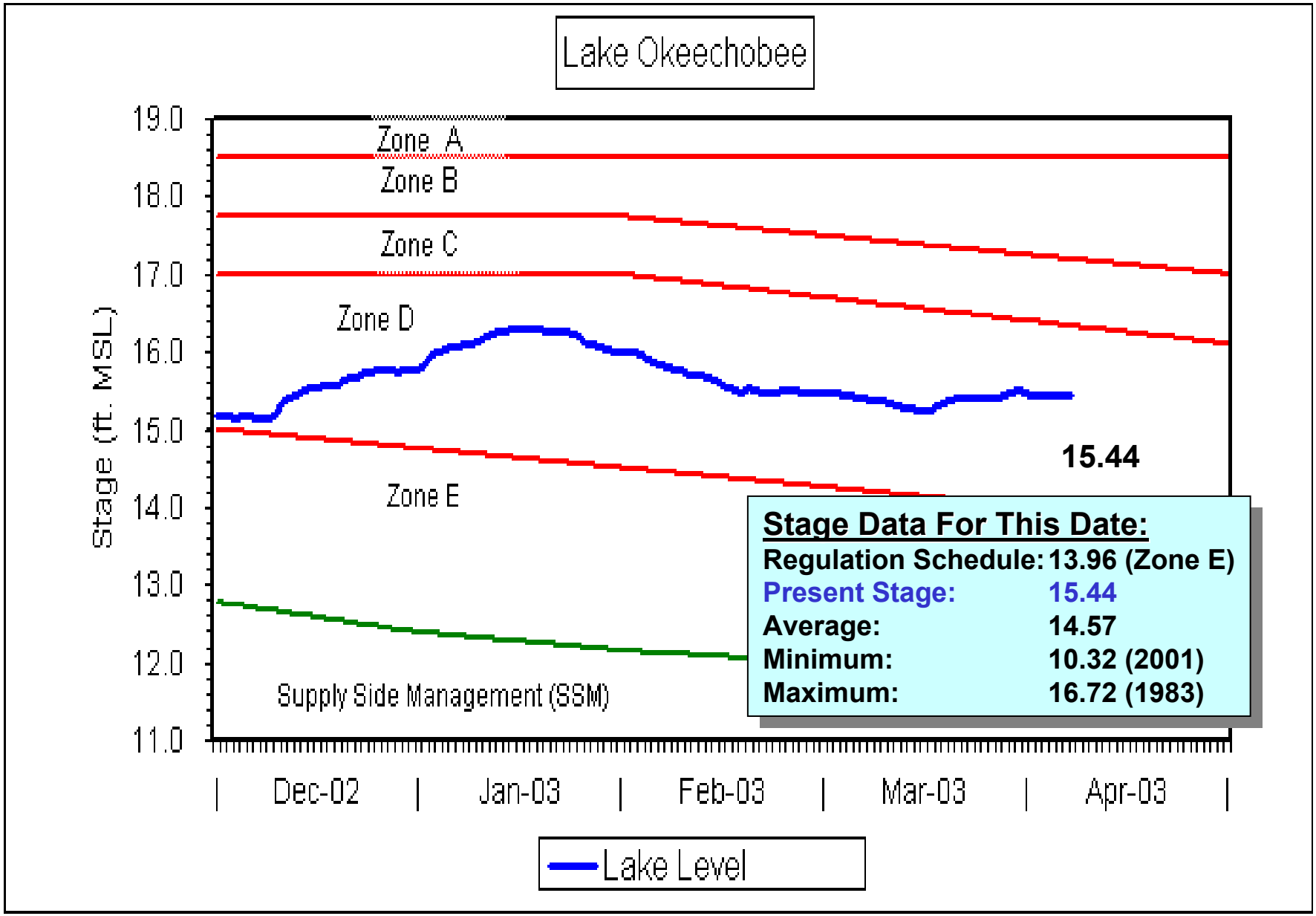

Kissimmee River Basin - Lake Tohopekaliga
07APR03 11:45:35
Rain
Elev in Ft NGVD
0
5
56
55
54
53
52
51
50
49
48
47
Jan Mar May Jul Sep Nov Jan Mar May Jul Sep Nov Jan
2002
2003
Lake Tohopekaliga
Alternate Regulation
Zone B Regulation
Zone B1 Regulation
Zone B1 (1996-1998)
Zone B2 Regulation
Precip @ S-61
Stage Data For This Date:
Regulation Schedule: 54.14
Present Stage: 53.40
Average: 53.37
Minimum: 48.56 (1979)
Maximum: 57.65 (1960)

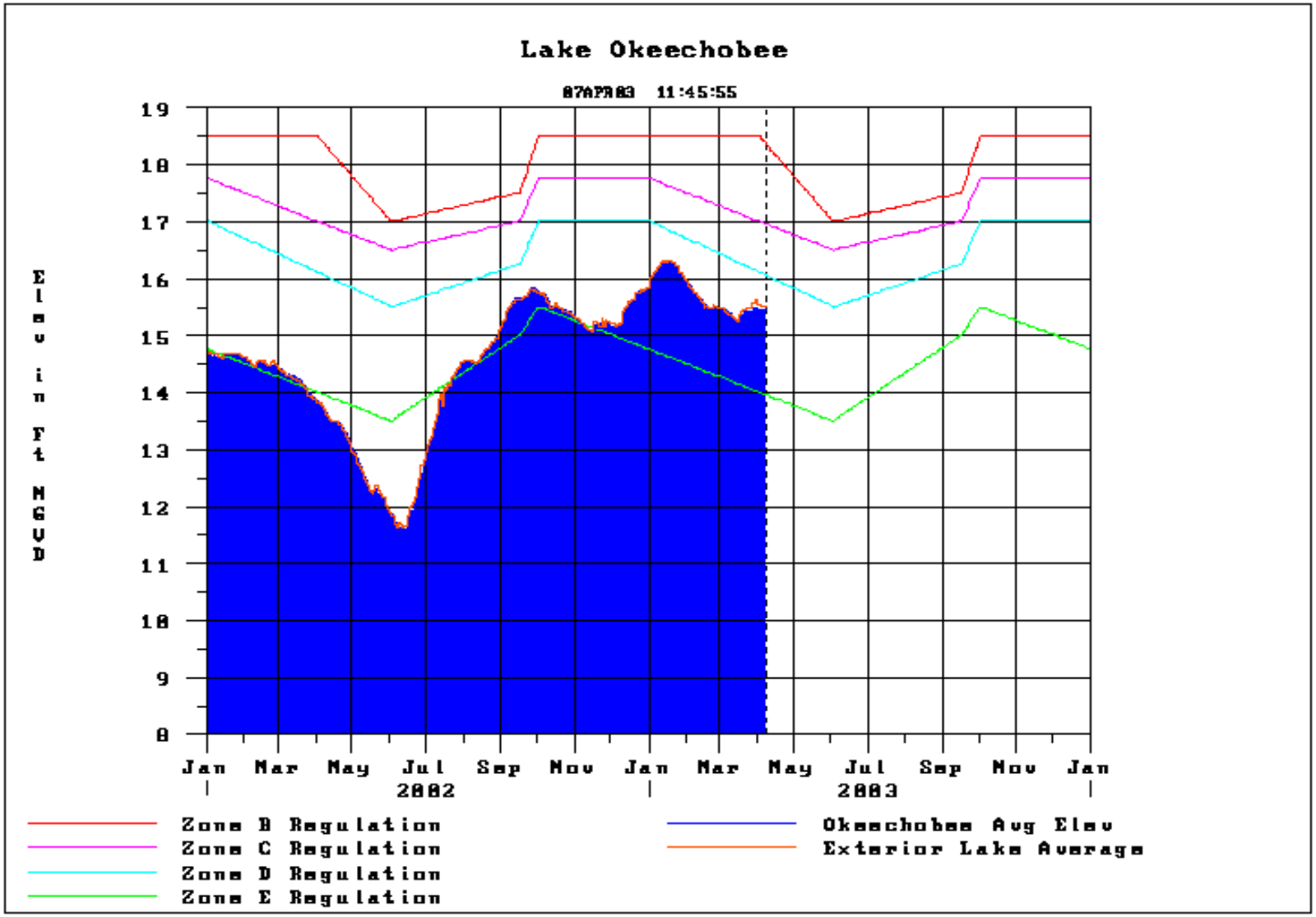

Kissimmee River Basin - Lake Kissimmee
07APR03 11:45:42
Rain
Elev in Ft NGVD
0
5
53.0
52.5
52.0
51.5
51.0
50.5
50.0
49.5
49.0
48.5
48.0
47.5
47.0
46.5
46.0
45.5
45.0
44.5
44.0
Jan Mar May Jul Sep Nov Jan Mar May Jul Sep Nov Jan
2002
2003
Lake Kissimmee Elev
Zone B Regulation
Zone B1 Regulation
Zone B2 Regulation
Precip @ S65
Stage Data For This Date:
Regulation Schedule: 52.14
Present Stage: 49.28
Average: 50.07
Minimum: 44.40 (1977)
Maximum: 54.44 (1960)


Tributary Basin Condition Indicators as of March 31, 2003
Upper & Lower Kissimmee 30-day Running Average of Net Rainfall
Net Rainfall (inches)
12
10
8
6
4
2
0
-2
-4
-6
4-1-2002
4-15-2002
4-29-2002
5-13-2002
5-27-2002
6-10-2002
6-24-2002
7-8-2002
7-22-2002
8-5-2002
8-19-2002
9-2-2002
9-16-2002
9-30-2002
10-14-2002
10-28-2002
11-11-2002
11-25-2002
12-9-2002
12-23-2002
1-6-2003
1-20-2003
2-3-2003
2-17-2003
3-3-2003
3-17-2003
3-31-2003
< Extremely Wet
< Very Wet
< Wet
> Dry
> Very Dry
Normal
S-65E 14-day Running Average of Flow
Flow (cfs)
10000
8000
6000
4000
2000
0
4-1-2002
4-15-2002
4-29-2002
5-13-2002
5-27-2002
6-10-2002
6-24-2002
7-8-2002
7-22-2002
8-5-2002
8-19-2002
9-2-2002
9-16-2002
9-30-2002
10-14-2002
10-28-2002
11-11-2002
11-25-2002
12-9-2002
12-23-2002
1-6-2003
1-20-2003
2-3-2003
2-17-2003
3-3-2003
3-17-2003
3-31-2003
< Extremely Wet
< Very Wet
< Wet
> Dry
> Very Dry
Normal

Hydrologic Conditions
Lake Okeechobee

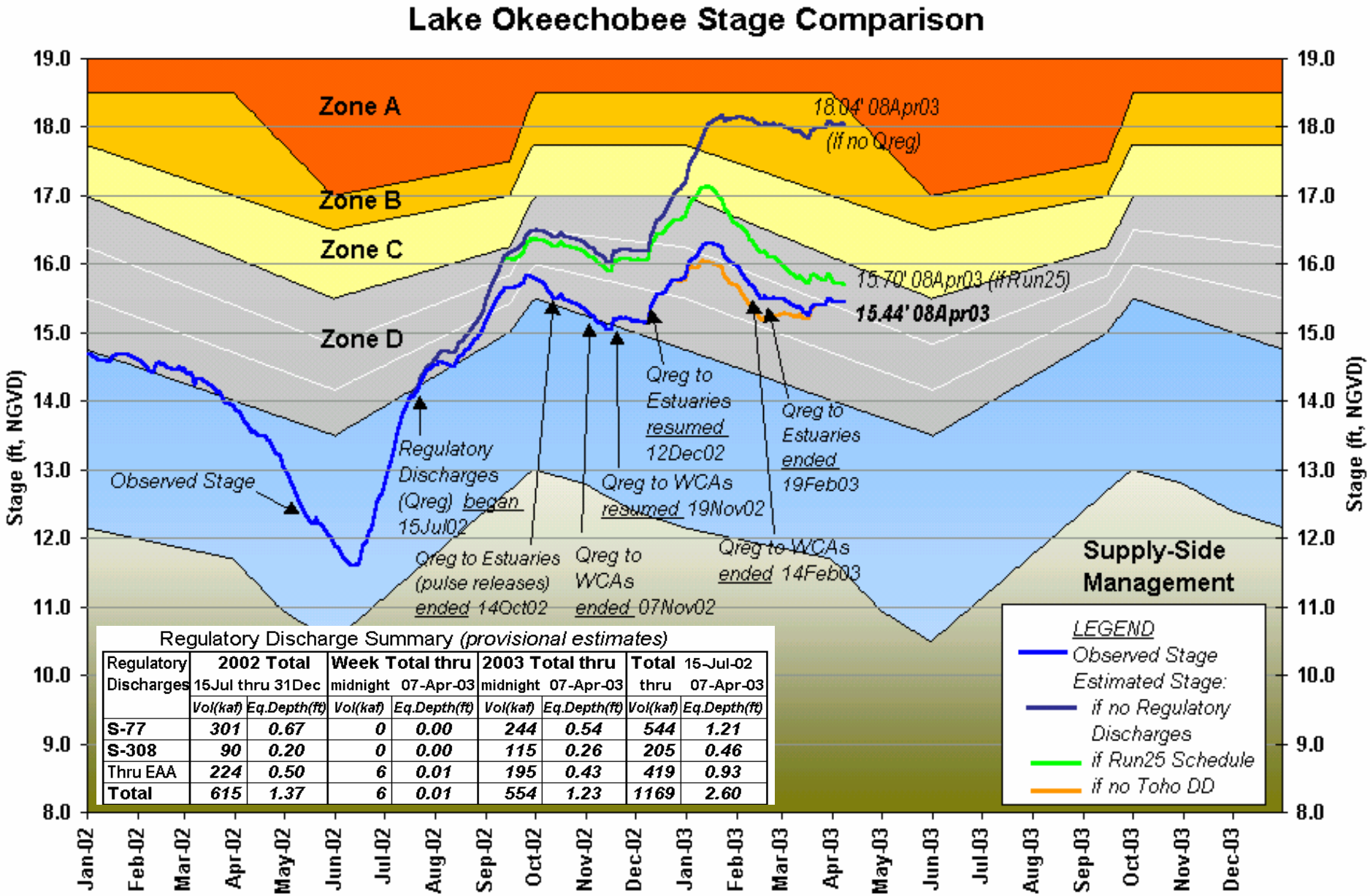
- Lake Okeechobee stages have been fairly stable over the past month in response to normal conditions in the tributary basin
- Stages in the lake have been above 15 ft NGVD Since September 2002
  - This condition is characterized as a having a “moderate probability of adverse impact” in the Adaptive Protocols for Lake Okeechobee Operations
  - However, stages may fall in response to anticipated low rainfall, increased evaporation & water use in April & May
  - Stages are not expected to reach the ecologically desired stage of 13.5 ft. by June 1st
- Ecological reports continue indicate
  - Areas of low light penetration,
  - Loss of some emergent vegetation


Lake Okeechobee
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
Stage (ft. MSL)
Zone A
Zone B
Zone C
Zone D
Zone E
Supply Side Management (SSM)
15.44
Stage Data For This Date:
Regulation Schedule: 13.96 (Zone E)
Present Stage: 15.44
Average: 14.57
Minimum: 10.32 (2001)
Maximum: 16.72 (1983)
Dec-02
Jan-03
Feb-03
Mar-03
Apr-03
Lake Level


Lake Okeechobee
07APR03 11:45:55
Elev in Ft NGVD
19
18
17
16
15
14
13
12
11
10
9
8
Jan
Mar
May
Jul
Sep
Nov
Jan
Mar
May
Jul
Sep
Nov
Jan
2002
2003
Zone B Regulation
Zone C Regulation
Zone D Regulation
Zone E Regulation
Okeechobee Avg Elev
Exterior Lake Average

Lake Okeechobee Current Operations

- **Regulation Schedule**
  - **Stage presently in Zone D**
  - Normal inflows
  - Normal rainfall
  - Normal seasonal forecast
  - Normal multi-seasonal forecast
- **Regulatory discharge to the WCAs (if no harm)**
- **No estuaries releases required**
  - Increased beneficial environmental releases (~500 CFS) to the Caloosahatchee River

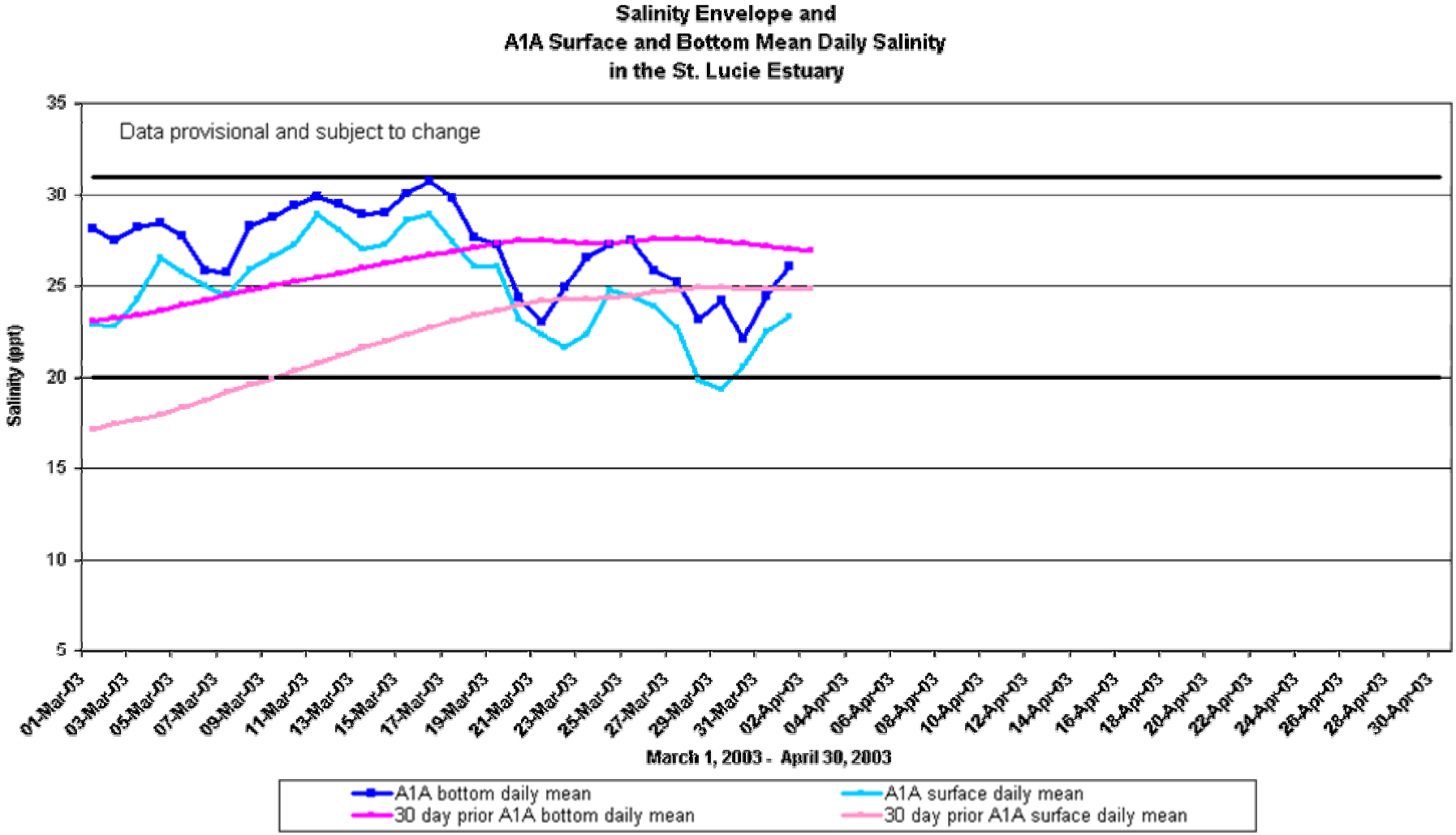


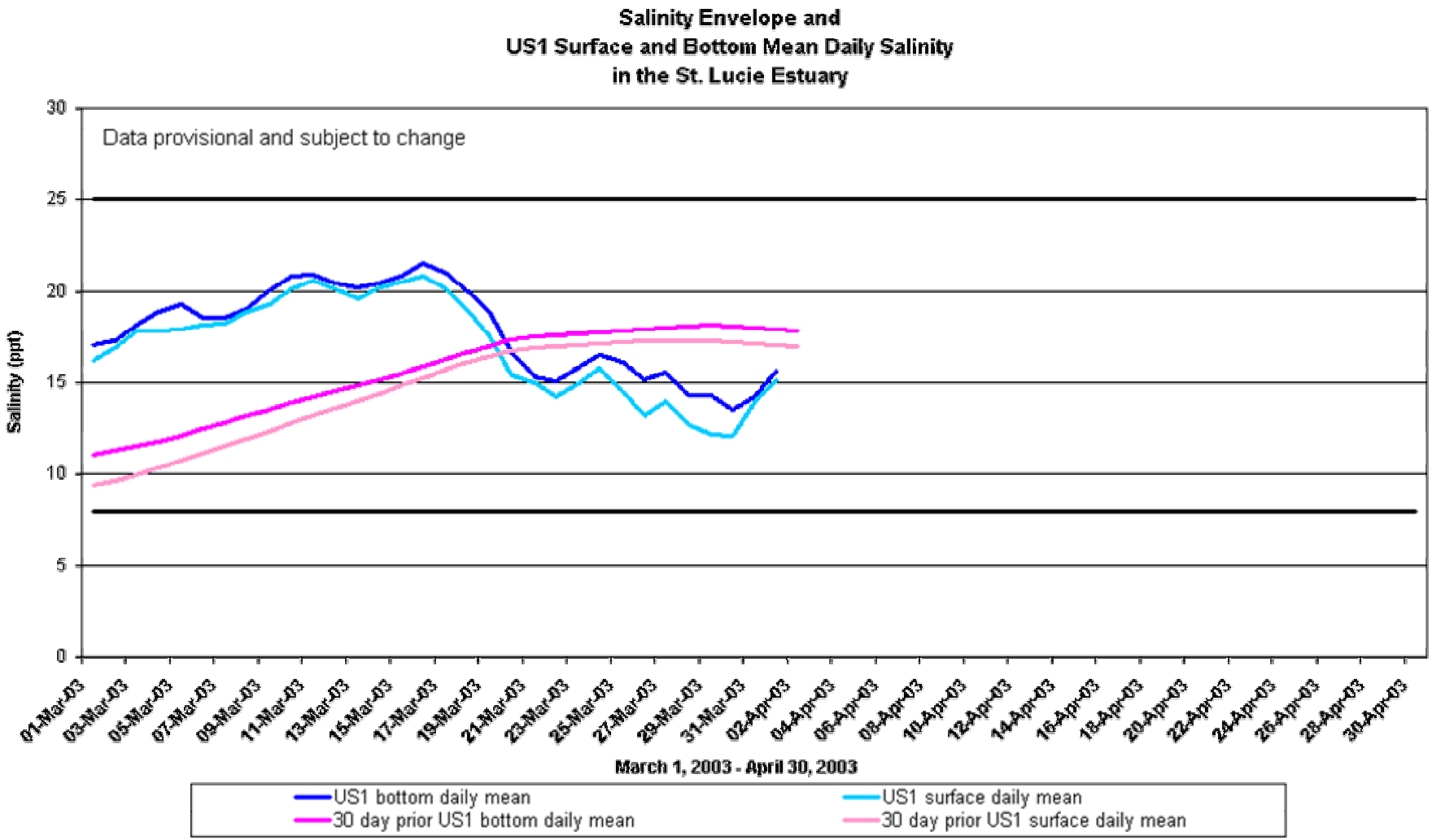
Regulatory Discharge Summary *(provisional estimates)*

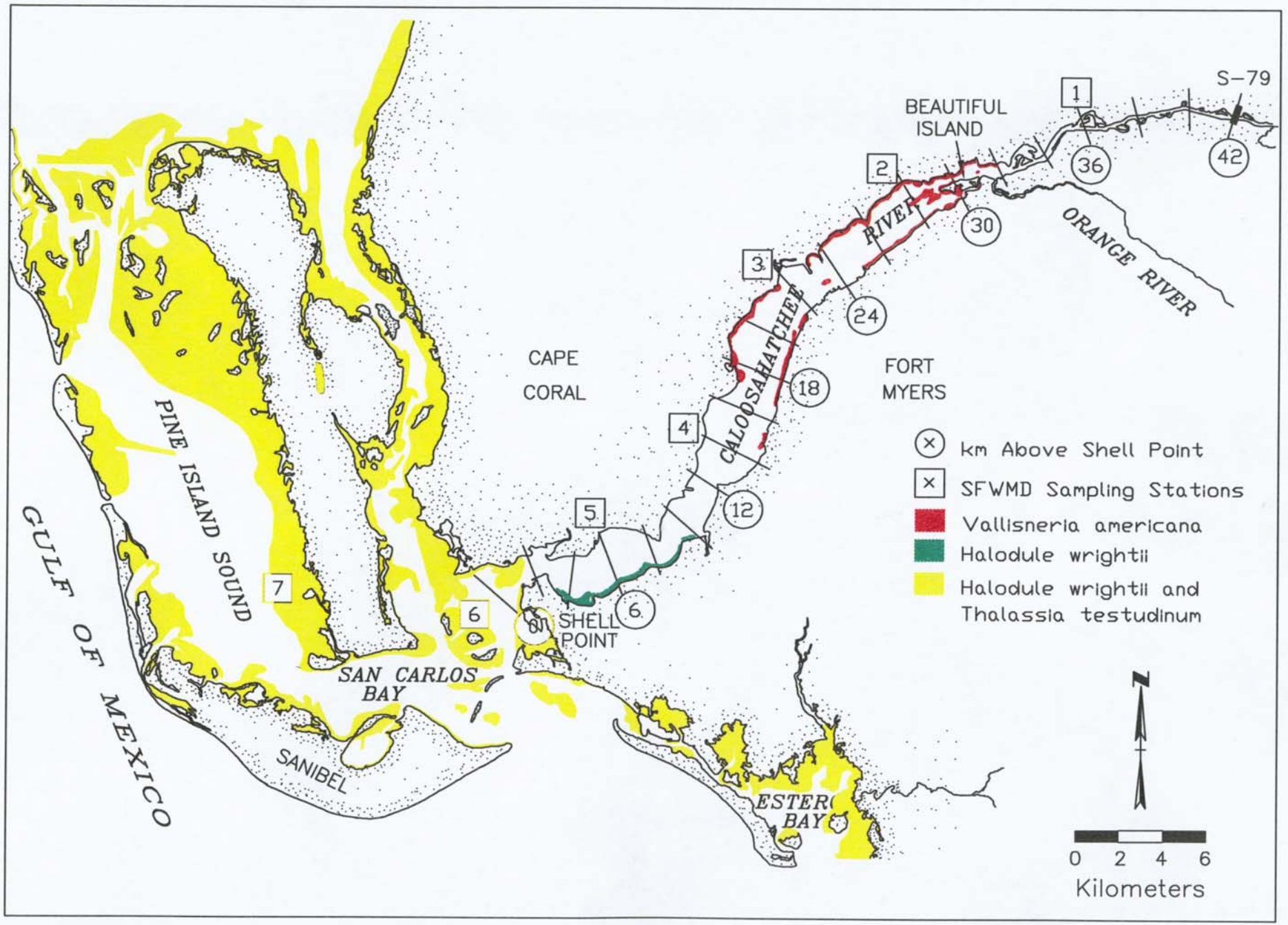
Regulatory Discharges	2002 Total 15Jul thru 31Dec		Week Total thru midnight 07-Apr-03		2003 Total thru midnight 07-Apr-03		Total 15-Jul-02 thru 07-Apr-03	
	Vol(kaf)	*Eq.Depth(ft)*	*Vol(kaf)*	*Eq.Depth(ft)*	*Vol(kaf)*	*Eq.Depth(ft)*	*Vol(kaf)*	*Eq.Depth(ft)*
S-77	***301***	***0.67***	***0***	***0.00***	***244***	***0.54***	***544***	***1.21***
S-308	***90***	***0.20***	***0***	***0.00***	***115***	***0.26***	***205***	***0.46***
Thru EAA	***224***	***0.50***	***6***	***0.01***	***195***	***0.43***	***419***	***0.93***
Total	***615***	***1.37***	***6***	***0.01***	***554***	***1.23***	***1169***	***2.60***

Hydrologic Conditions
St. Lucie Estuary

- Surface and bottom salinity values at both the Roosevelt Bridge and A-1-A Bridge are within the preferred range

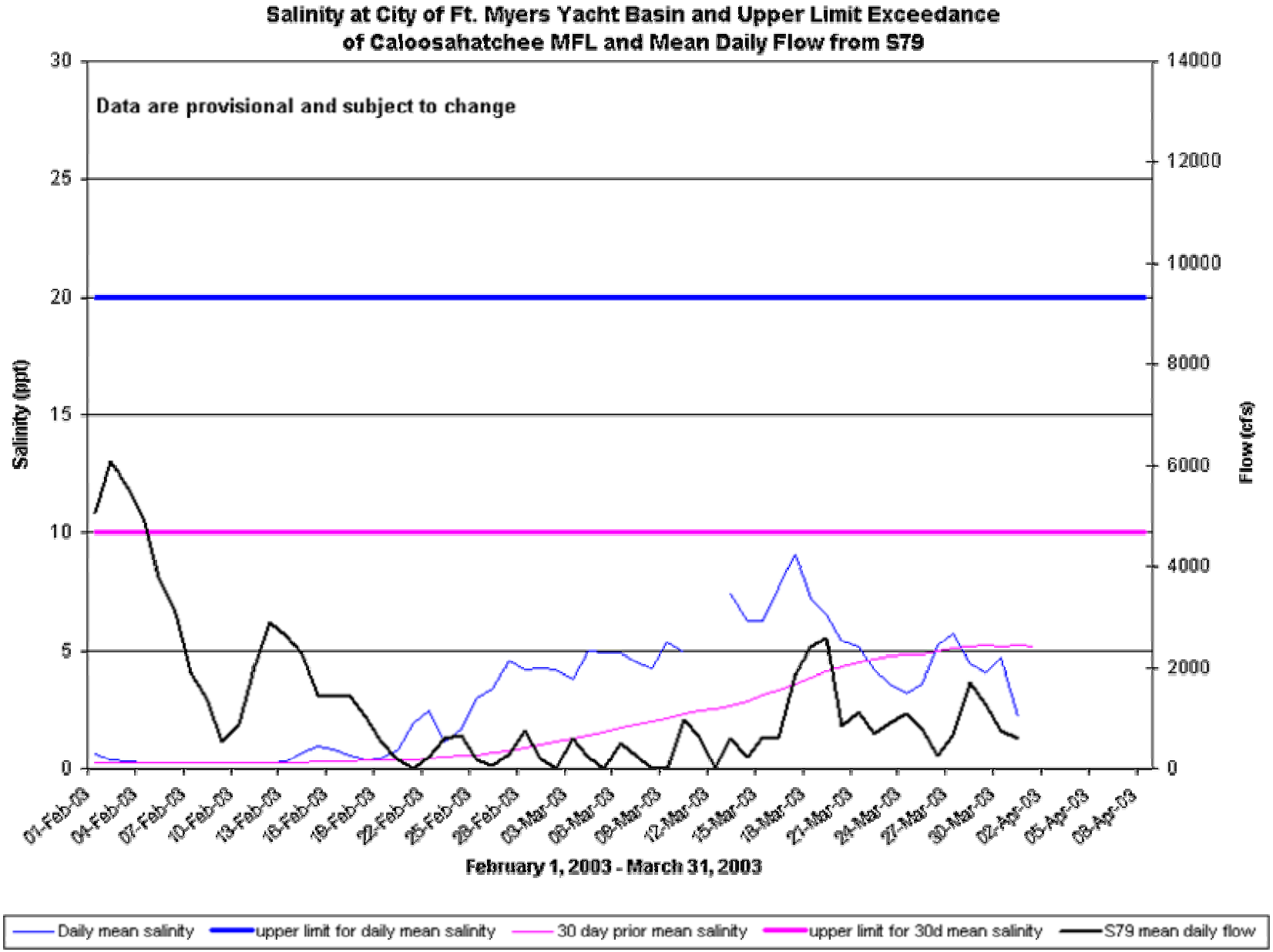

Salinity Envelope and
A1A Surface and Bottom Mean Daily Salinity
in the St. Lucie Estuary
Data provisional and subject to change
Salinity (ppt)
35
30
25
20
15
10
5
01-Mar-03
03-Mar-03
05-Mar-03
07-Mar-03
09-Mar-03
11-Mar-03
13-Mar-03
15-Mar-03
17-Mar-03
19-Mar-03
21-Mar-03
23-Mar-03
25-Mar-03
27-Mar-03
29-Mar-03
31-Mar-03
02-Apr-03
04-Apr-03
06-Apr-03
08-Apr-03
10-Apr-03
12-Apr-03
14-Apr-03
16-Apr-03
18-Apr-03
20-Apr-03
22-Apr-03
24-Apr-03
26-Apr-03
28-Apr-03
30-Apr-03
March 1, 2003 - April 30, 2003
A1A bottom daily mean
A1A surface daily mean
30 day prior A1A bottom daily mean
30 day prior A1A surface daily mean

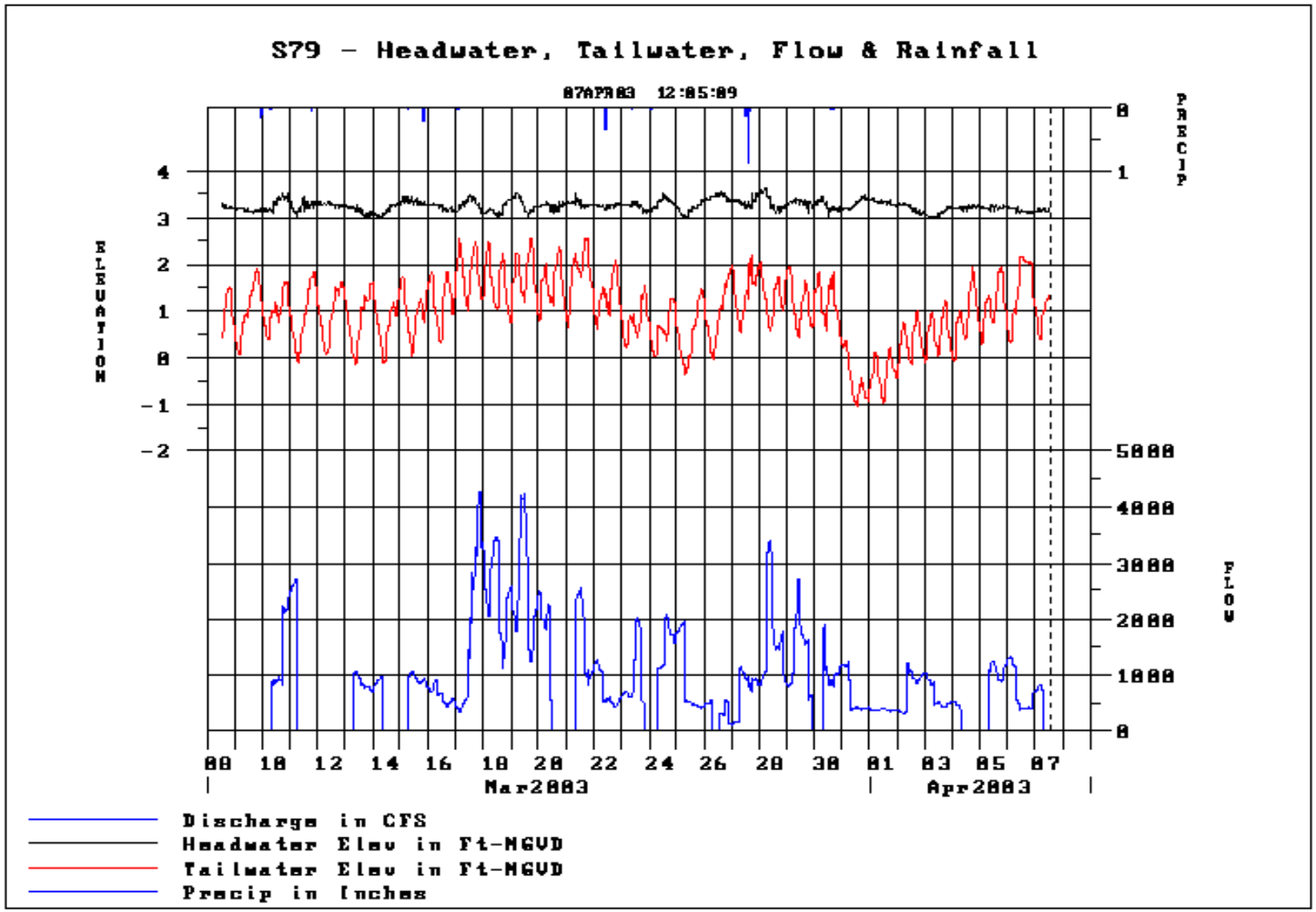

Salinity Envelope and
US1 Surface and Bottom Mean Daily Salinity
in the St. Lucie Estuary
Data provisional and subject to change
Salinity (ppt)
30
25
20
15
10
5
0
01-Mar-03
03-Mar-03
05-Mar-03
07-Mar-03
09-Mar-03
11-Mar-03
13-Mar-03
15-Mar-03
17-Mar-03
19-Mar-03
21-Mar-03
23-Mar-03
25-Mar-03
27-Mar-03
29-Mar-03
31-Mar-03
02-Apr-03
04-Apr-03
06-Apr-03
08-Apr-03
10-Apr-03
12-Apr-03
14-Apr-03
16-Apr-03
18-Apr-03
20-Apr-03
22-Apr-03
24-Apr-03
26-Apr-03
28-Apr-03
30-Apr-03
March 1, 2003 - April 30, 2003
US1 bottom daily mean
US1 surface daily mean
30 day prior US1 bottom daily mean
30 day prior US1 surface daily mean


S-79
BEAUTIFUL ISLAND
1
2
3
4
5
6
7
36
42
30
24
18
12
6
RIVER
CALOOSAHATCHEE
ORANGE RIVER
CAPE CORAL
FORT MYERS
SHELL POINT
PINE ISLAND SOUND
GULF OF MEXICO
SAN CARLOS BAY
SANIBEL
ESTERO BAY
km Above Shell Point
SFWMD Sampling Stations
Vallisneria americana
Halodule wrightii
Halodule wrightii and Thalassia testudinum
N
0 2 4 6
Kilometers

Hydrologic Conditions Caloosahatchee Estuary

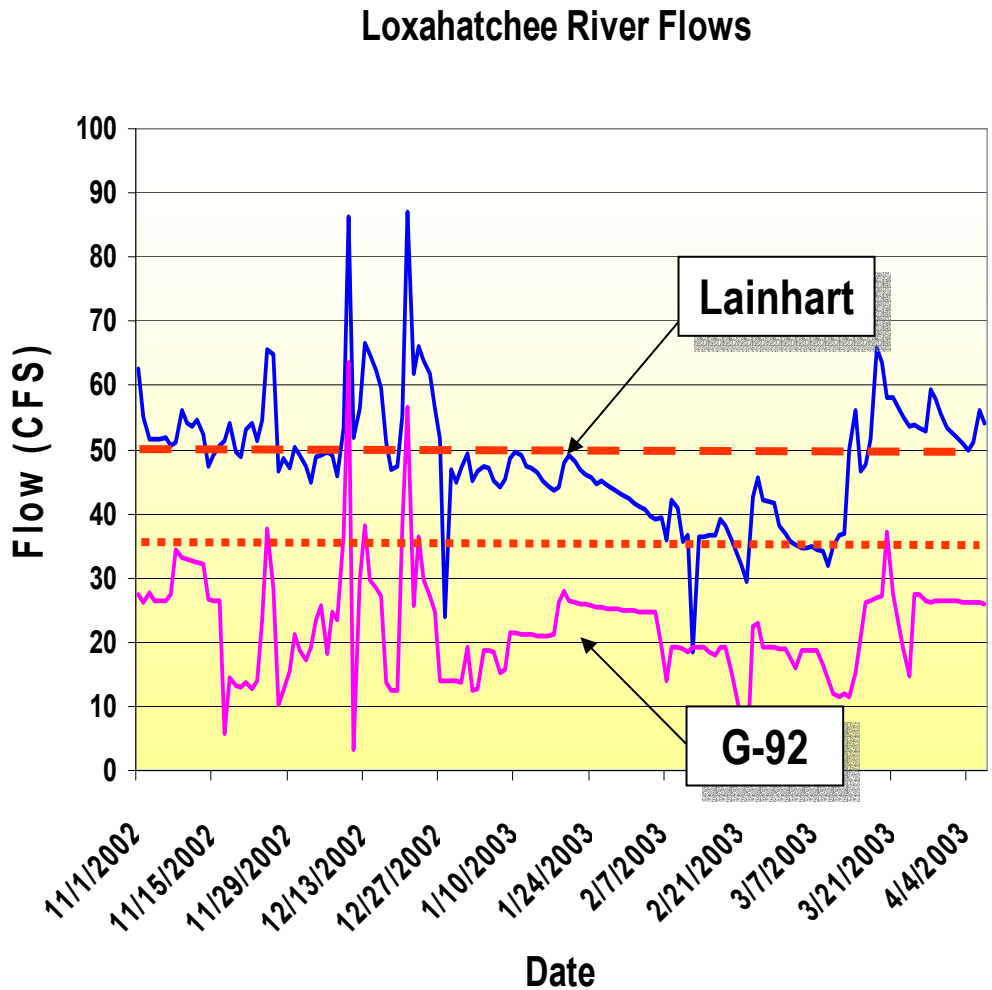
- Salinity values in the upper estuary are within the preferred range for freshwater submerged plants
  - USACE is currently releasing additional beneficial quantities of freshwater to the estuary
    - 500 cfs 10-day average
      - » Up from 300 cfs initiated in February


Salinity at City of Ft. Myers Yacht Basin and Upper Limit Exceedance of Caloosahatchee MFL and Mean Daily Flow from S79
Data are provisional and subject to change
Salinity (ppt)
Flow (cfs)
30
25
20
15
10
5
0
14000
12000
10000
8000
6000
4000
2000
0
01-Feb-03
04-Feb-03
07-Feb-03
10-Feb-03
13-Feb-03
16-Feb-03
19-Feb-03
22-Feb-03
25-Feb-03
28-Feb-03
03-Mar-03
06-Mar-03
09-Mar-03
12-Mar-03
15-Mar-03
18-Mar-03
21-Mar-03
24-Mar-03
27-Mar-03
30-Mar-03
02-Apr-03
05-Apr-03
08-Apr-03
February 1, 2003 - March 31, 2003
Daily mean salinity
upper limit for daily mean salinity
30 day prior mean salinity
upper limit for 30d mean salinity
S79 mean daily flow


S79 - Headwater, Tailwater, Flow & Rainfall
07APR03 12:05:09
ELEVATION
PRECIP
FLOW
4
3
2
1
0
-1
-2
0
1
5000
4000
3000
2000
1000
0
00 10 12 14 16 18 20 22 24 26 28 30 01 03 05 07
Mar2003
Apr2003
Discharge in CFS
Headwater Elev in Ft-NGVD
Tailwater Elev in Ft-NGVD
Precip in Inches

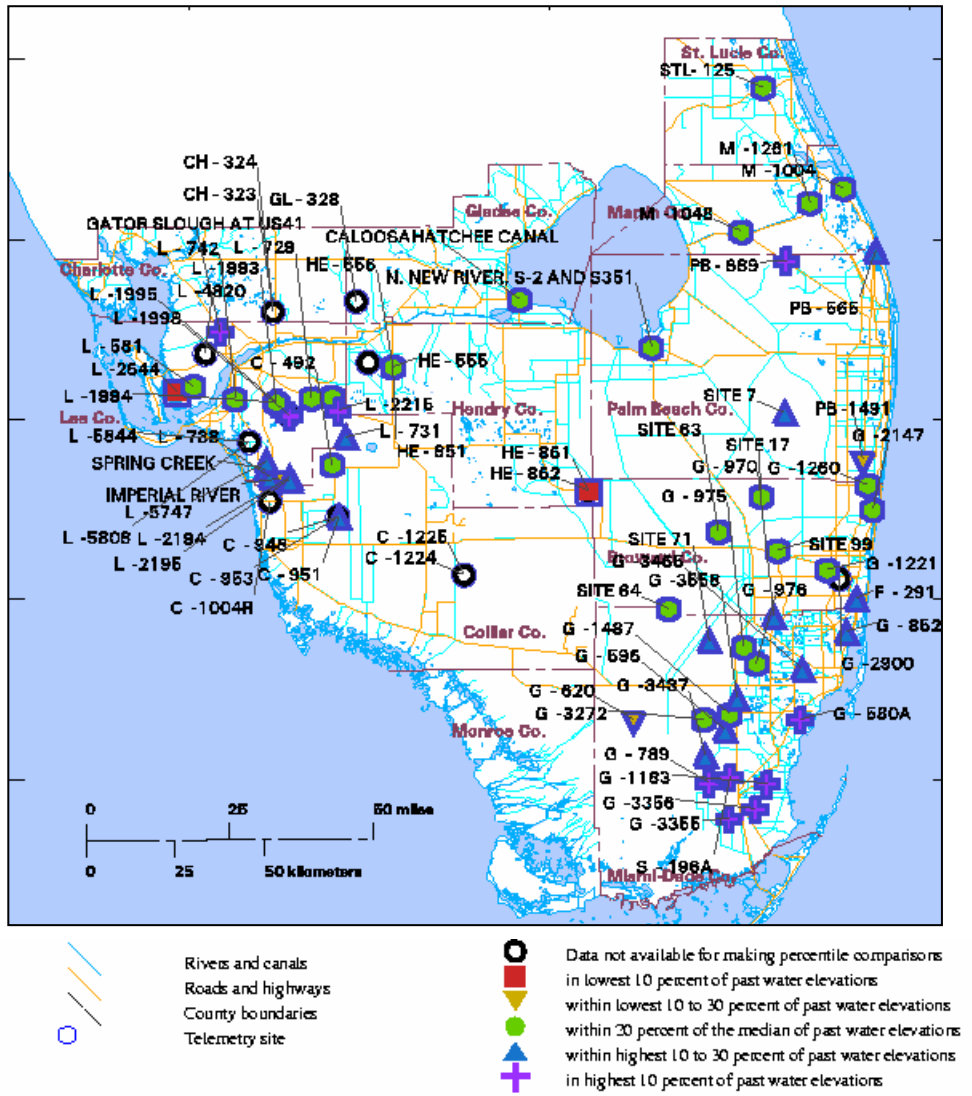
Loxahatchee River

- Recent rainfall have increased flows in the Loxahatchee River Basin
- Flow across Lainhart Dam has been above the operational target of 50 cfs since about March 15th

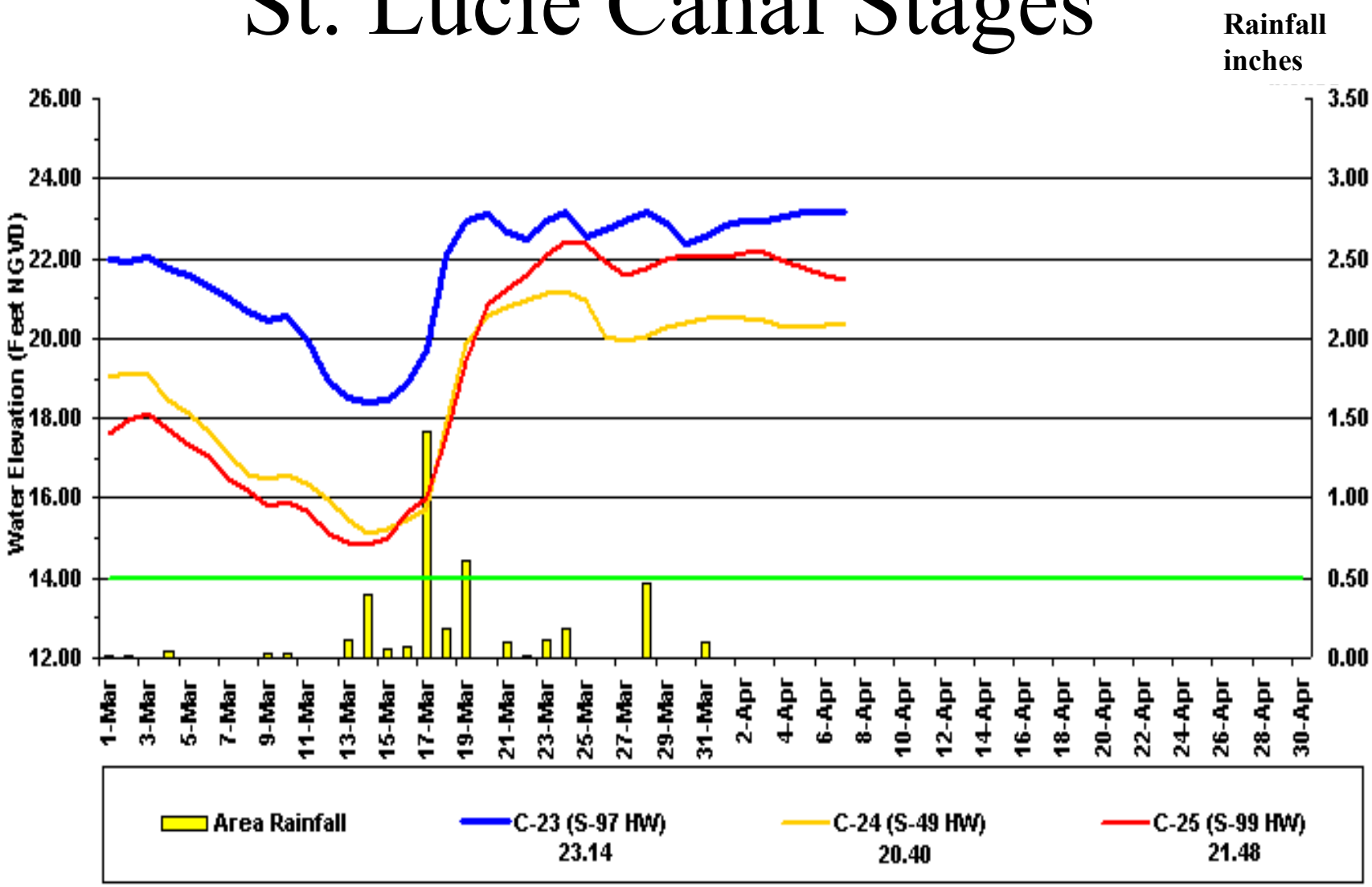


Groundwater Conditions

- Upper East Coast
  - Normal seasonal levels
- Lower East Coast
  - Normal seasonal levels
- Lower West Coast Region:
  - Mid-Hawthorn below normal seasonal levels

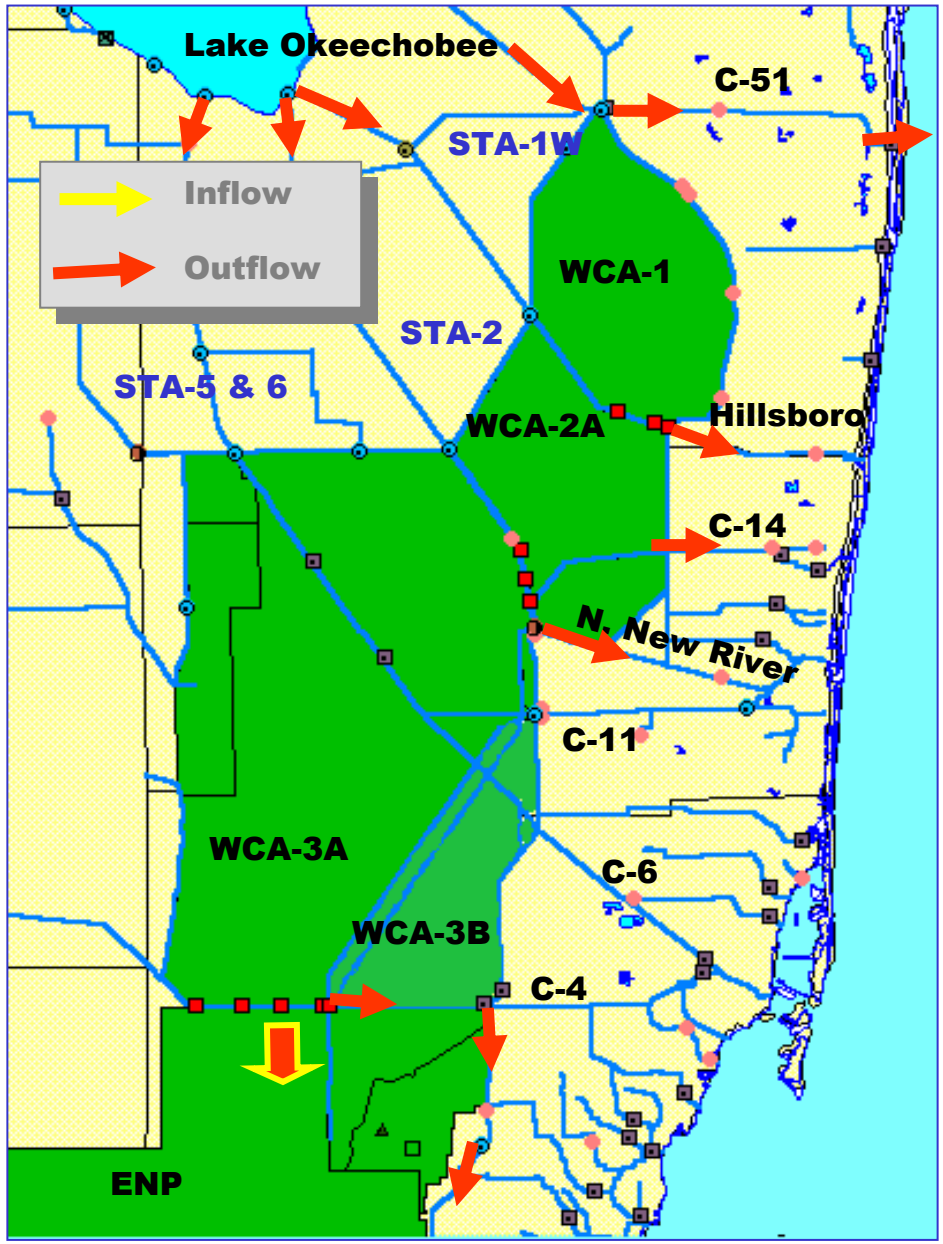


St. Lucie Canal Stages



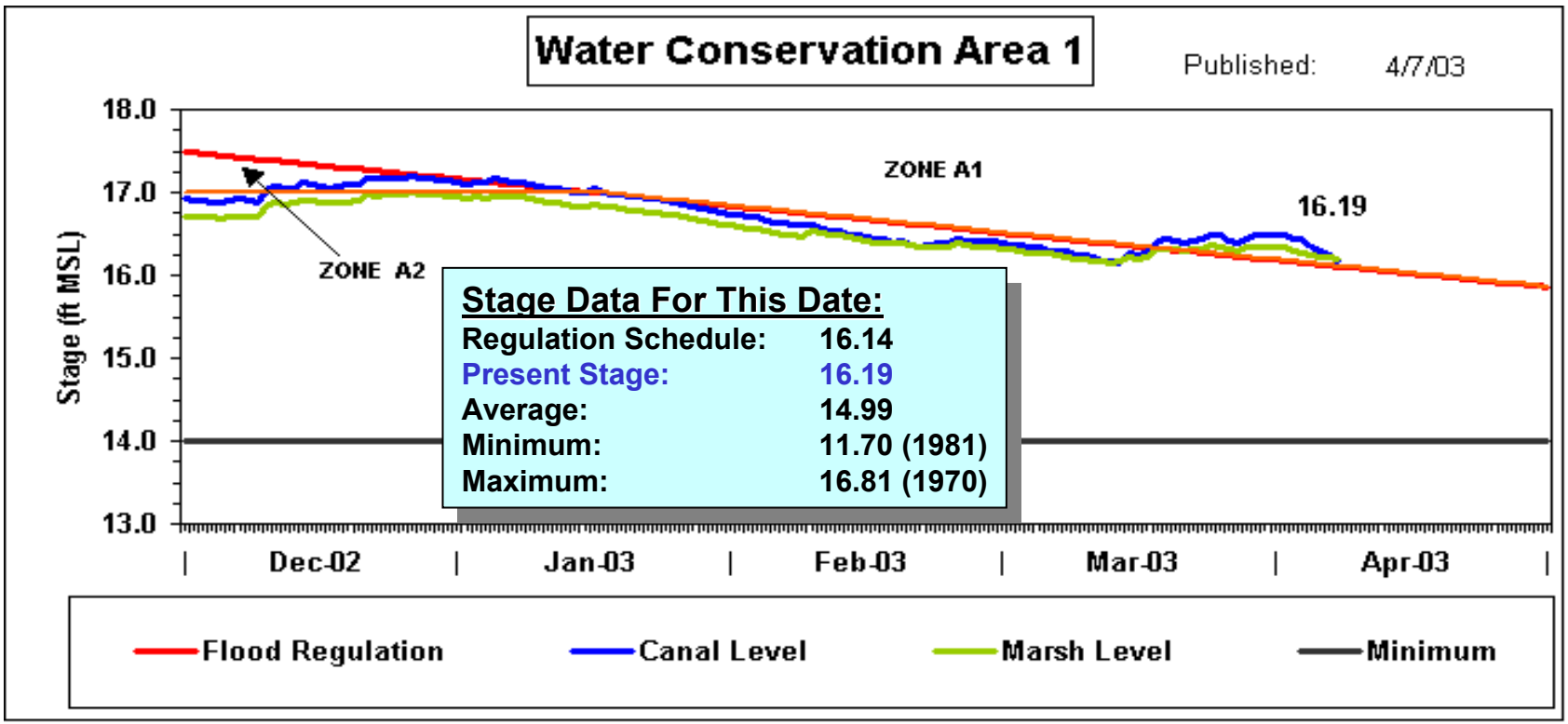
Water Conservation Areas

- WCA-1 stages slightly above schedule
- WCA-2A stages are above regulation schedule
- WCA-3A stages are in Zone E1 of the regulation schedule
  - Deliveries to Everglades National Park under the “Rainfall Plan”
- Small regulatory releases from Lake Okeechobee are being made via L-8 to C-51 and tide



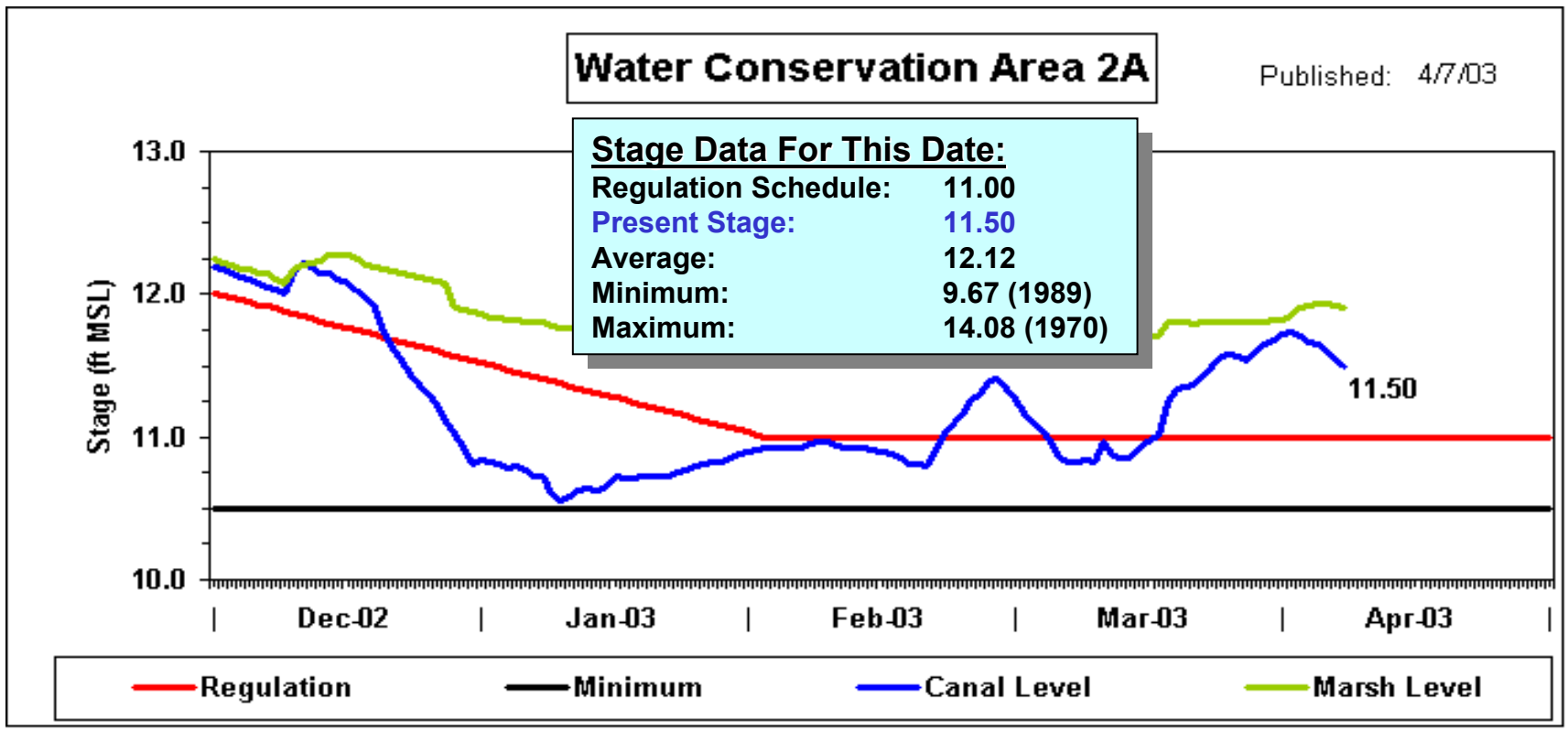
Hydrologic Conditions
Water Conservation Area No. 1

- Stages moved above regulatory schedule



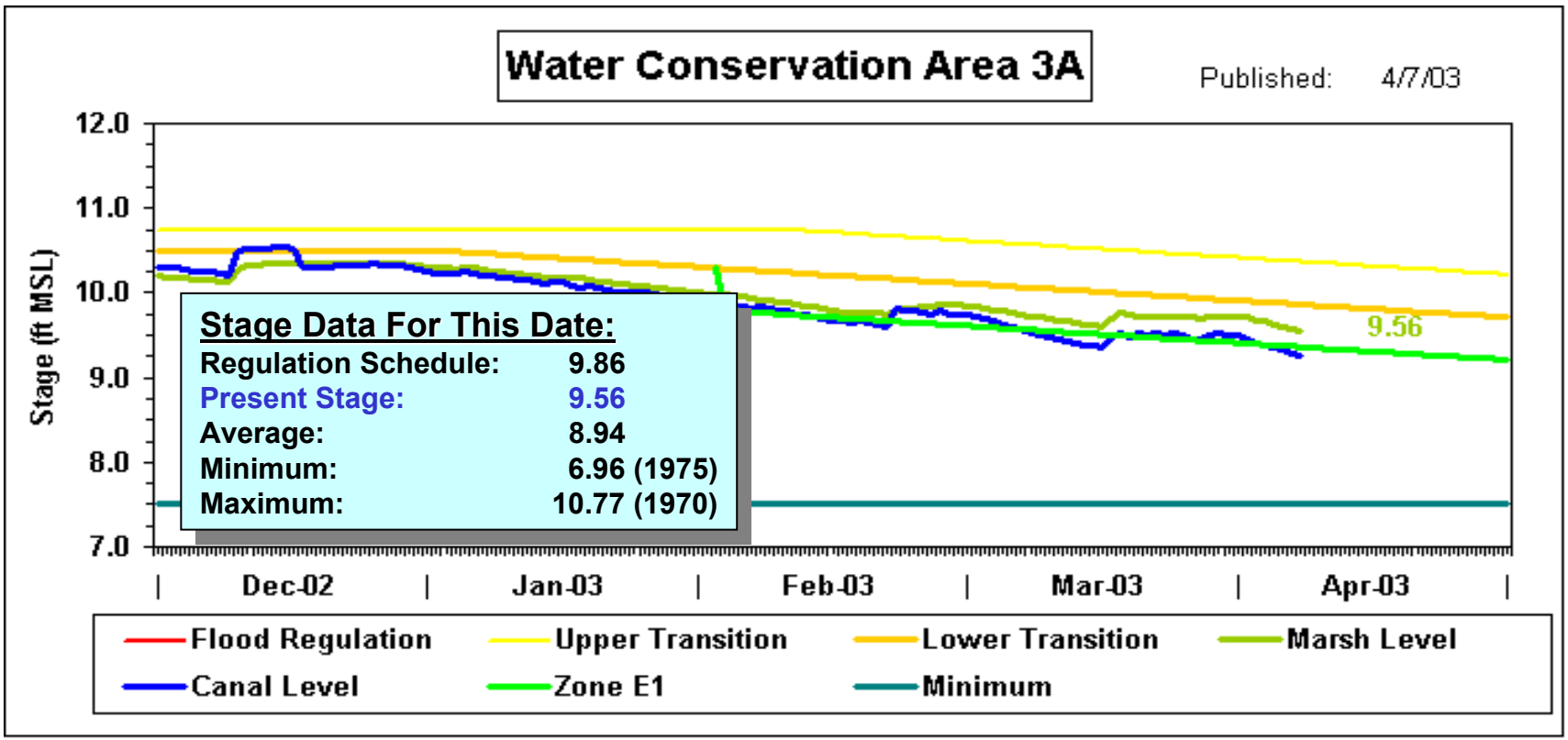
Hydrologic Conditions
Water Conservation Area No. 2A

- Below regulation schedule since late December



Hydrologic Conditions
Water Conservation Areas

- Stages remain in Zone E1 under the Interim Operating Plan



Hydrologic Conditions
SDCS Current Operations

- Operations over the passed several months have been oriented to provide water supply deliveries to South Dade.
- Regulatory releases from WCA-3A to SDCS over the past 2 weeks
- IOP Column 2 Operations
  - Pumping at S-331, 332B,C &D
  - Gravity flow at S-338, S-194 & S-196

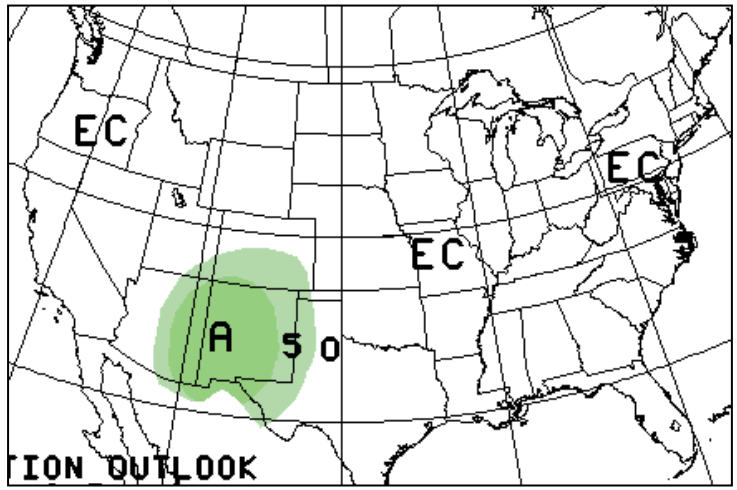
SDCS - IOP Current Operations

Climate Outlook

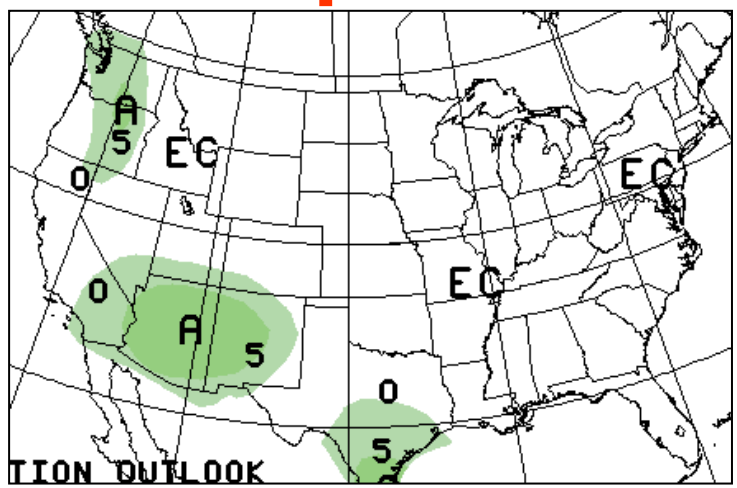
Governing Board Presentation - April 10, 2003

Seasonal Climatic Outlook

- CPC reports that March thru May 2003 has an "equal" probability of above average, average, or below average precipitation



April

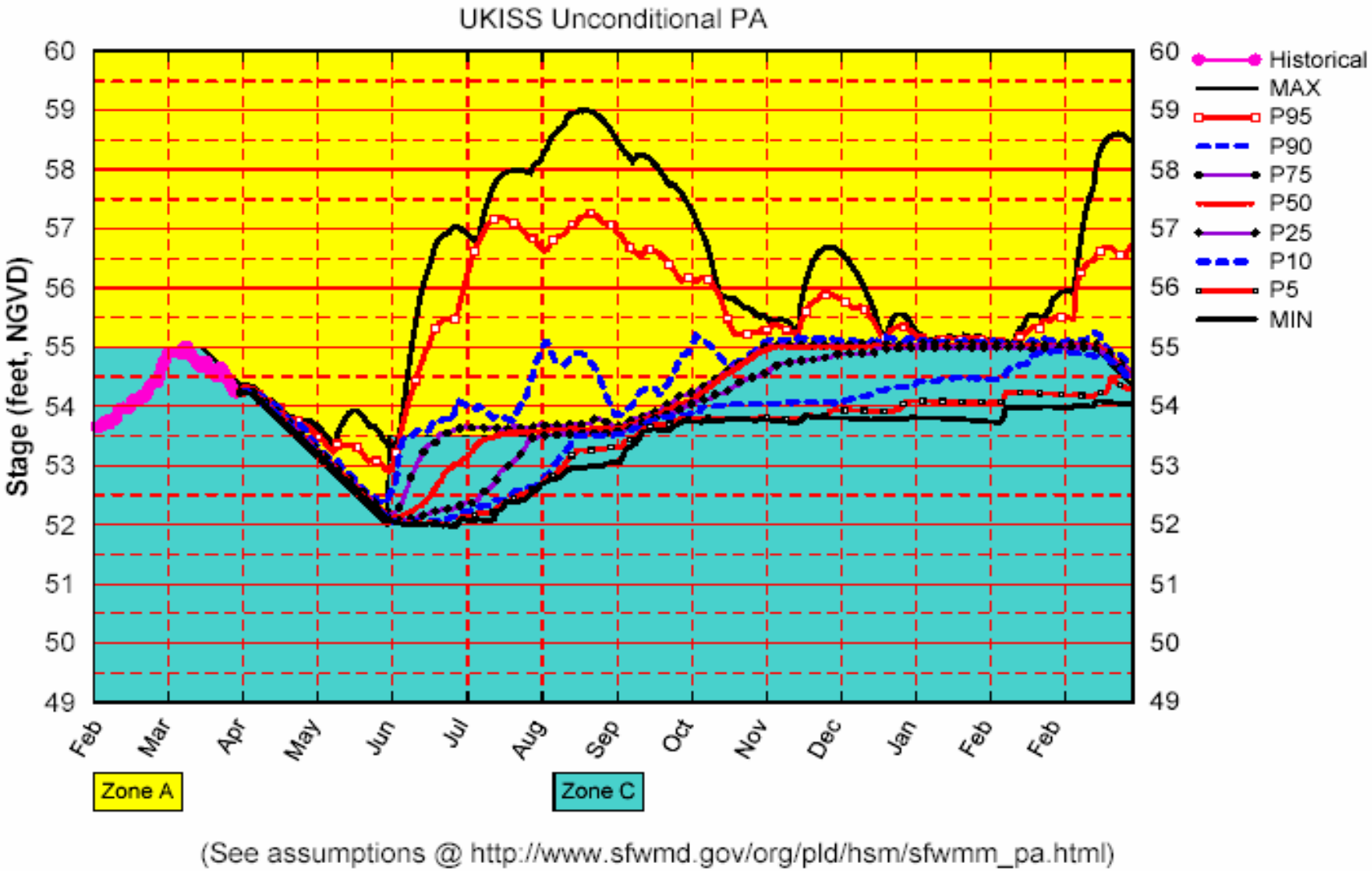


Apr-May-Jun

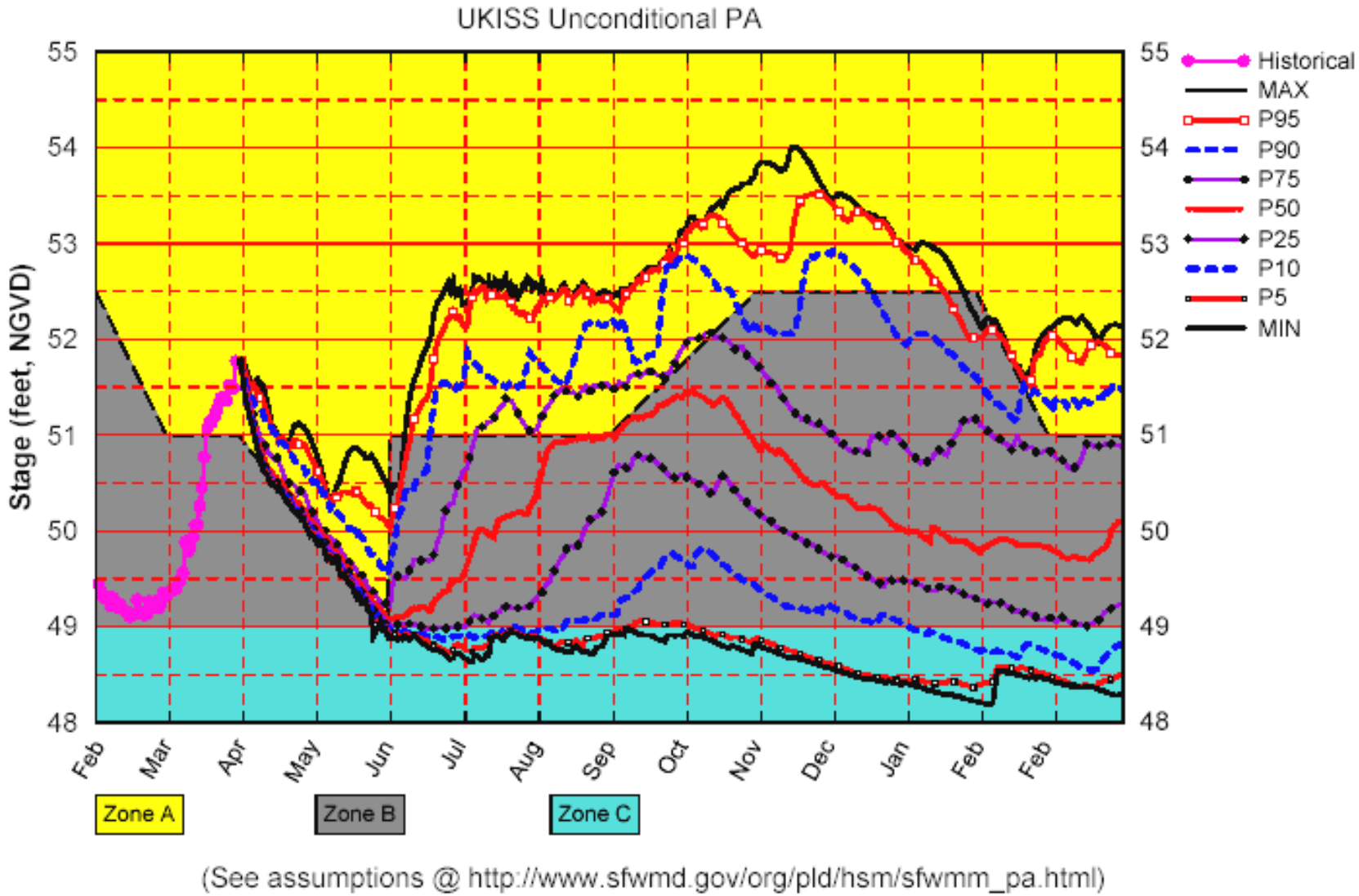
Hydrologic Outlook

Governing Board Presentation - April 10, 2003

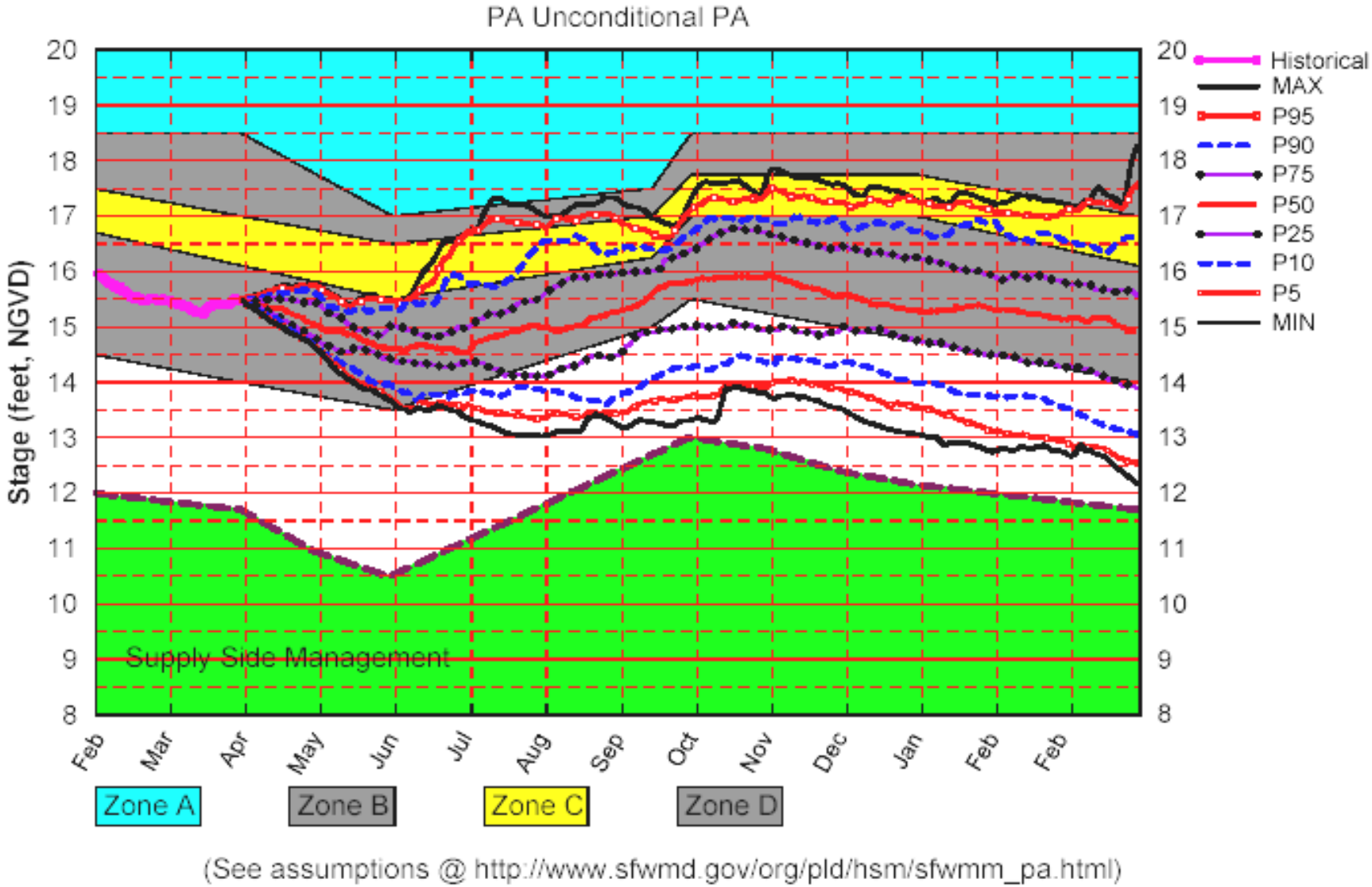
S61 UKISS Apr 2003 Position Analysis



S65 UKISS Apr 2003 Position Analysis



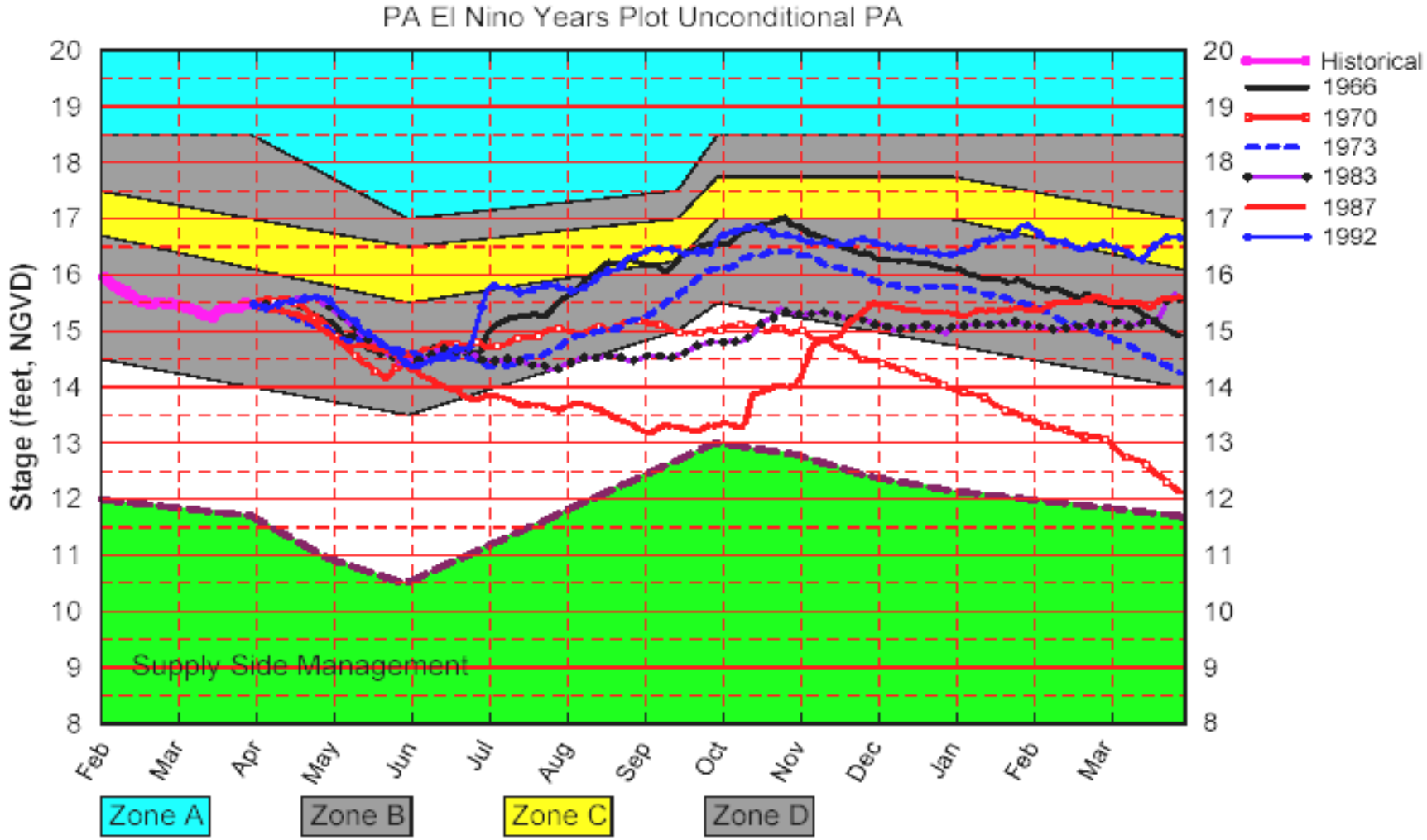
Lake Okeechobee SFWMM Apr 2003 Position Analysis



(See assumptions @ http://www.sfwmd.gov/org/pld/hsm/sfwmm_pa.html)

Thu Apr 3 17:07:02 2003

Lake Okeechobee SFWMM Apr 2003 Position Analysis



(See assumptions @ http://www.sfwmd.gov/org/pld/hsm/sfwmm_pa.html)

Thu Apr 3 17:07:55 2003

Operational Outlook

Governing Board Presentation - April 10, 2003

Operational Outlook

- Current Lake Okeechobee Regulation Schedule calls for no estuary releases to mitigate high stage impacts
  - Releases south to the WCAs are constrained by STA construction, high stages and water quality issues
- Beneficial environmental deliveries to the Caloosahatchee River from Lake Okeechobee have made since mid February under the “Adaptive Protocols For Lake Okeechobee Operations”
  - **Avg 300-500 cfs while stages remain in Zone D**
  - **Report to the Governing Board monthly**
  - **Termination of releases will occur if Lake Okeechobee stages fall into Zone E**

Operational Outlook

- Under the current conditions the Lake Okeechobee Regulation Schedule (WSE) requires that excess water is directed south to the Water Conservation Areas (WCAs)
  - If beneficial or with minimal impact to the Everglades
- However, conditions currently exist that significantly constrain our ability to send lake regulatory releases to the WCAs

Operational Outlook

- Current Constraints…
  - Stages in the WCAs are currently above their regulation schedules
  - Construction is currently underway in STA-1W, which is significantly constraining flow capacity
  - STA-1W treatment efficiency has been reduced due to the treatment of large lake regulatory releases over the past 6 months
    - Need to provide the STA an opportunity to recover over the next few months

Operational Outlook

- Because of rising salinities in the Upper Caloosahatchee Estuary, additional freshwater inflows would improve environmental conditions
  - Optimum average flow ranges between 300 and 800 cubic feet per second (CFS)
  - Flows above 500cfs could induce some damage
- The “Adaptive Protocols for Lake Okeechobee” limit discretionary flows to an average of 300 CFS in Zone D

Operational Outlook

- The “Adaptive Protocols for Lake Okeechobee” require staff to obtain Governing Board direction if environmental deliveries are required in excess of 300 CFS.
- The “Eight County Coalition” approved a resolution at their March 10th meeting supporting additional beneficial releases to the Caloosahatchee Estuary from Lake Okeechobee thru the remainder of this dry season

Coalition Resolution

- *"The County Coalition calls upon the Army Corps of Engineers and the South Florida Water Management District to ensure adequate amounts of water that approximates 500-800 cfs are released to the Caloosahatchee River to maintain a proper salinity envelope, to ensure the optimal health of its fresh water resources, and to help reduce water levels in Lake Okeechobee for the remainder of the 2003 dry season only."*

Operational Outlook

- The Statistical “Position Analysis” for Lake Okeechobee indicates…
  - a very low probability of water shortage restrictions due to stages in Lake Okeechobee this season
  - A less than 5% chance that stages will reach or fall below 13.5 ft. NGVD by June 1st
  - A less than 10% chance that stages will reach or fall below 14.0 ft. NGVD by June 1st

Operational Outlook

- Lake stages are close to being within 0.5 ft. of the bottom of Zone C
- With Zone C receding, there is a significant probability that stages could be within 0.5 ft. of Zone C in the next couple of weeks
- If this occurs, consideration may be given to the initiation of regulatory releases if supported by the tributary conditions

Operational Outlook

- Staff proposes…
  - That over the remainder of the 2002/2003 dry season,
  - While the Lake Okeechobee Regulation Schedule requires releases south to the WCAs (Zone D), and
  - While constraints remain that limit southerly discharge exist, and
  - While sufficient water for water supply is available in the lake, and
  - While water from Lake Okeechobee is needed to improve Caloosahatchee Estuary conditions,
  - Then…

Operational Outlook

- The District will request that the Corps of Engineers initiate environmental releases to the Caloosahatchee Estuary from Lake Okeechobee __CFS average daily flow
- If larger releases are needed in the future,….???